05 week

Overview

Tutor Discussion feedback

- the idea of self-advocacy, trust, voluntary treatment and acts of adminstering eye-drops and adhereing to their medical regime is great and important
- the 'psychological impact of assistive device scale' is interesting and a great way to link project to key-words. Perhaps you only need three words as the scale of your project is smaller than what this scale usually deals with.
- even if the data you are provided by the optoms is negative, that is ok and might even help you navigate and narrow the objectives of your project. for example, if optoms say they prefer a cheaper aid then this could help - but what they say isn't going to be the absolute answer.
- it is agreed that what the optoms say will hold some bias and not the 'lived-experience' of the paitents, therefore their values and what they suggest can be different to what the end-user feels and experiences.
- it was a great point in regard to when paitents associate the 'stingy' painful administeration of eye drops to be distribing, thus subsonsciously allowing the user to associate a negative feeling with admistering eye drops - therefore, it is a great idea to re-assure the paitents that adhering to their prescibed eye-drop regime or medical treatment, even if it hurts, it is the right way to adminster their prescirbed treatment. Ultimately, providing comfort, re-assurance, confirmation and support that what the paitent is doing in regard to adhereing to the prescribed medication, is the right things to do in order to health better their condition. therefore, providing and emphasising a feeling of 'empowerment' and progress, opposed to feeling no matter if you adhered to your prescibed treatment there is no progess being made. So providing a visually universal tracker or suppotive component of the 'kit' to encourage the paitent to continue their treatmeant no matter if it hurts, is important and helping their condition.
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Survey Questions - Ethics Disclaimer

Medical Adherence for Patients with Glaucoma through Treatment

Medical Adherence for Patients with Glaucoma & Dry Eye through Treatment Management and Product Intervention

OVERVIEW OF PROJECT:
The following questions aim to inform a QUT Industrial Design Capstone Unit project, exploring the need for an assistive medical adherence device to support glaucoma and dry-eye patients. It focuses in particular on those with cognitive, physical, or educational barriers, thus to understand how to administer eye drops correctly and consistently. The survey gathers insights from eye-health professionals on patient challenges, current solutions, and their perceived demand for such an intervention. Further, this survey is mostly categorised in a linear scale as per the following "1 - Strongly Disagree, 2 - Disagree, 3 - Neutral (or Neither Agree nor Disagree), 4 - Agree, and 5 - Strongly Agree"

By continuing below, you are indicating that you:

- Have read and understood the information document regarding this research project.
- Have had any questions answered to your satisfaction.
- Understand that if you have any additional questions you can contact the research team.
- Understand that you are free to withdraw without comment or penalty.
- Understand that if you have concerns about the ethical conduct of the research project you can contact me on email n11348267@qut.edu.au
- Agree to participate in the research project via a survey

For more information about the completed ethics document, please click on the following link https://connectqutedu-my.sharepoint.com/:w:/r/personal/n11348267_qut_edu_au/Documents/DNB311_Survey_Participant_Information_Sheet.docx?d=w23b9f59a14be40f3a2e936028398e1e7&csf=1&web=1&e=8zu45G

Thank you for taking the time to complete this survey. Your insights are greatly valued and will contribute to advancing optometry through the development of innovative product interventions aimed at improving patient adherence and overall eye health outcomes!

Survey Questions

Do you understand that you are consenting to participate in this research project as per the previous link and information above

- ◯ Yes
- ◯ No

1. I am currently

- ☐ Practicing Optometrist
- ☐ Ophthalmologist
- ☐ Optometry Academic
- ☐ Masters Student of Optometry

2. I have patients who experience difficulty adhering to prescribed eye drop regimens

1	2	3	4	5
◯	◯	◯	◯	◯

3. In my experience, dementia significantly impacts a patient's ability to follow prescribed glaucoma treatment plans, even with the assistance of nurses or caregivers

1	2	3	4	5
◯	◯	◯	◯	◯

4. Parkinson's disease impacts a patient's ability to self-administer eye drops correctly.

1	2	3	4	5
◯	◯	◯	◯	◯

5. Regular forgetfulness (unrelated to diagnosed conditions) is a common reason for missed or incorrect doses.

1	2	3	4	5
◯	◯	◯	◯	◯

Survey Questions

6. Age-related decline (e.g., reduced mobility, vision, dexterity) is a major barrier to eye drop adherence.

1 2 3 4 5

7. A lack of patient education and understanding about glaucoma treatment reduces voluntary participation in care.

1 2 3 4 5

8. Many of my patients have limited upper limb mobility or grip strength that affects their ability to use standard eye drop bottles.

1 2 3 4 5

9. I believe that an assistive device designed for patients with reduced grip strength would improve treatment adherence.

1 2 3 4 5

10. A device that ensures the correct drop dosage and frequency would reduce medication wastage and improve outcomes.

1 2 3 4 5

11. A complex treatment regimen for dry eye or glaucoma (e.g warm compressions, lid massages, scheduled eye drops) significantly impacts patients' adherence to their prescribed care plan.

1 2 3 4 5

Survey Questions

12. I would avoid recommending standard dry eye management (e.g., lubricants, lid massage, warm compress, lid hygiene, supplements) because I believe the complexity of the regimen may lead to poor patient adherence

1 2 3 4 5

13. I observe that many patients with glaucoma or dry eye are not well informed about their prescribed treatment and often hesitate to ask questions or seek further information

1 2 3 4 5

14. I believe conditions affecting joint mobility, such as arthritis or Parkinson's disease, are a major factor when considering contact lens recommendations (especially scleral lenses), as insertion and removal difficulties may deter recommendation despite therapeutic benefits.

1 2 3 4 5

15. I would refrain from recommending contact lenses due to potential insertion or removal difficulties in patients with conditions such as arthritis or Parkinson's disease, despite the lenses being therapeutically beneficial (e.g., scleral lenses for severe dry eye)

1 2 3 4 5

16. Reminders (audible, visual, or app-based) are effective in improving patient adherence.

1 2 3 4 5

17. My patients would benefit from a combined device that both assists in drop administration and provides reminders.

1 2 3 4 5

Survey Questions

18. There is a clear gap in the market for products that combine physical assistance with adherence monitoring.

1 2 3 4 5

19. I am aware of existing products designed to help patients self-administer eye drops.

1 2 3 4 5

19a. If so, please provide an example of what in-markets you would suggest

Long answer text

20. I have seen positive outcomes when patients use eye drop administration aids.

1 2 3 4 5

20a. If not, please provide a description as to why.

Long answer text

21. I believe a medical adherence product designed specifically for glaucoma patients with physical or cognitive impairments is needed

1 2 3 4 5

Survey Questions - long responses

22. What are your views on the potential value of a supportive medical adherence intervention and please describe any patient challenges you have observed, existing solutions you are aware of?

Long answer text

23. What you would like to see in future product interventions regarding assistive eye drop devices, reminder products or general eye health products?

Long answer text

24. Would you be open to participating in a follow-up interview (either in-person or by phone) to help further inform this research? If so, please leave your email below and I will contact you

Short answer text

Survey Answers

Medical Adherence for Patients with Glaucoma through Treatment Management and Product Intervention (Responses)

File Edit View Insert Format Data Tools Extensions Help

Timestamp	Do you understand that you are consenting tc	1. I am currently
8/17/2025 14:32:21	Yes	Practicing Optometrist
8/17/2025 14:34:51	Yes	Practicing Optometrist
8/17/2025 14:45:05	Yes	Masters Student of Optc
8/17/2025 14:46:36	Yes	Masters Student of Optc
8/17/2025 16:03:12	Yes	Practicing Optometrist
8/17/2025 16:03:49	Yes	Practicing Optometrist
8/17/2025 16:23:19	Yes	Masters Student of Optc
8/17/2025 17:48:08	Yes	Practicing Optometrist
8/17/2025 20:22:26	Yes	Practicing Optometrist
8/22/2025 13:52:29	Yes	Masters Student of Optc
8/22/2025 21:41:05	Yes	Masters Student of Optc
8/29/2025 20:24:49	Yes	Practicing Optometrist

The following data is categoried into the following data categories (at the bottom of data in spreadsheet

- Mean
- Median
- Mode
- Standard Deviation

The following data is categoried into the following colour scheme

- Neither agree or disagree
- Agree
- Disagree

Survey Answers

Question 2: I have had patients who experience difficulty adhering to prescribed eye drop regimens

Question 3: In my experience, dementia significantly impacts a patient's ability to follow prescribed glaucoma treatment plans, even with the assistance of nurses or caregivers

2. I have patients who experience difficulty ac	3. In my experience, dementia significantly im
5	5
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4	5
3	5
4	4.181818182
4	5
4	5
0.7745966692	1.07871978

Survey Answers

Question 4. Parkinson's disease impacts a patient's ability to self-administer eye drops correctly.

Question 5. Regular forgetfulness (unrelated to diagnosed conditions) is a common reason for missed or incorrect doses.

4. Parkinson's disease impacts a patient's abi	5. Regular forgetfulness (unrelated to diagno:
5	4
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5	4
5	5
5	5
5	5
4.545454545	4.636363636
5	5
5	5
0.687551651	0.5045249791

Survey Answers

Question 6. Age-related decline (e.g., reduced mobility, vision, dexterity) is a major barrier to eye drop adherence.

Question 7. A lack of patient education and understanding about glaucoma treatment reduces voluntary participation in care.

6. Age-related decline (e.g., reduced mobility,	7. A lack of patient education and understanc
5	3
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4.363636364	4.727272727
4	5
5	5
0.6741998625	0.6466697907

Survey Answers

Question 8. Many of my patients have limited upper limb mobility or grip strength that affects their ability to use standard eye drop bottles.

Question 9. I believe that an assistive device designed for patients with reduced grip strength would improve treatment adherence.

8. Many of my patients have limited upper lim	9. I believe that an assistive device designed
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4	4
3	3
2	3
2	2
4	5
3	4
2	4
3	3.727272727
3	4
2	3
1	1.009049958

Survey Answers

Questions 10. A device that ensures the correct drop dosage and frequency would reduce medication wastage and improve outcomes.

Question 11. A complex treatment regimen for dry eye or glaucoma (e.g warm compressions, lid massages, scheduled eye drops) significantly impacts patients' adherence to their prescribed care plan.

10. A device that ensures the correct drop do	11. A complex treatment regimen for dry eye
4	5
4	4
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5	4
4	5
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5	3
5	4
4	4
4.272727273	4.181818182
4	4
5	4
0.7862453931	0.7507571935

Survey Answers

Question 12. I would avoid recommending standard dry eye management (e.g., lubricants, lid massage, warm compress, lid hygiene, supplements) because I believe the complexity of the regimen may lead to poor patient adherence

Question 13. I observe that many patients with glaucoma or dry eye are not well informed about their prescribed treatment and often hesitate to ask questions or seek further information

12. I would avoid recommending standard dr	13. I observe that many patients with glaucor
4	4
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1	2
3	5
4	2
2	3
2.636363636	3.636363636
3	4
1	5
1.501514387	1.286291357

Survey Answers

Question 14. I believe conditions affecting joint mobility, such as arthritis or Parkinson's disease, are a major factor when considering contact lens recommendations (especially scleral lenses), as insertion and removal difficulties may deter recommendation despite therapeutic benefits.

Question 15. I would refrain from recommending contact lenses due to potential insertion or removal difficulties in patients with conditions such as arthritis or Parkinson's disease, despite the lenses being therapeutically beneficial (e.g., scleral lenses for severe dry eye)

14. I believe conditions affecting joint mobilit	15. I would refrain from recommending conta
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4	3
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5	4
5	4
1.07871978	1.009049958

Survey Answers

Question 16. Reminders (audible, visual, or app-based) are effective in improving patient adherence.

Question 17. My patients would benefit from a combined device that both assists in drop administration and provides reminders.

16. Reminders (audible, visual, or app-based)	17. My patients would benefit from a combin
3	3
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3	4
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4.090909091	4.090909091
4	4
5	4
0.8312094146	0.7006490497

Survey Answers

18. There is a clear gap in the market for products that combine physical assistance with adherence monitoring.

19. I am aware of existing products designed to help patients self-administer eye drops.

18. There is a clear gap in the market for proc	19. I am aware of existing products designed
5	4
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4	4
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4	1
4	4
4	2
4.181818182	2.636363636
4	2
4	4
0.6030226892	1.433368569

Survey Answers

Question 19a. If so, please provide an example of what in-markets you would suggest

Question 20. I have seen positive outcomes when patients use eye drop administration aids.

19a. If so, please provide an example of what	20. I have seen positive outcomes when patie
Silicon eye drop guide	1
	3
	4
	5
	3
Assistant tool for Hyloforte pump bottles. The nev	3
	1
	3
	5
	1
assisted squeezer (eg on amazon)	3
	3
	2.909090909
	3
	3
#DIV/0!	1.445997611

Survey Answers

Question 20a. If not, please provide a description as to why.

Question 21. I believe a medical adherence product designed specifically for glaucoma patients with physical or cognitive impairments is needed

Question 21a. If so, I would recommend such a device to my patients if it were proven safe, effective, and affordable.

20a. If not, please provide a description as to	21. I believe a medical adherence product des	21a. If so
Availability issues	3	Yes
	4	Yes
	5	Yes
	5	Yes
	3	Yes
Haven't come across a patient who uses it	2	Yes
	4	Yes
	5	Yes
	3	Yes
Devices are often not easily accessible (not availa	4	Yes
moreso haven't seen many people who've used th	4	Yes
	3	Yes
	3.818181818	
	4	
	4	
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Survey Answers

Question 22. What are your views on the potential value of a supportive medical adherence intervention and please describe any patient challenges you have observed, existing solutions you are aware of?

Needs to be more beneficial than mobile phone reminders so having something with mobility assistance would be beneficial. Needs to be available and affordable though.
Adherence and persistence are major barriers in glaucoma care. Even on a small scale, patients struggle with daily lubricants due to laziness or forgetfulness. I remind patients to use drops around the same time as other medications, or to leave it in the same area to
I think a supportive adherence intervention would be really helpful since many patients forget doses or don’t realize how important consistency is. A reminder device would help greatly in terms of patient adherence. Additionally, many patients struggle with putting
It would be very valuable to avoid patients forgetting and/or ignoring their treatment due to difficulty of inserting eye drops.
Even with supportive medical adherence intervention to help remind patient to use the medication or to release the liquid from the bottle, we cannot determine if the eyedrop is going into the eye or not as a many patient struggle with things getting close to their
I believe there needs to be patient buy in for them to take their treatment more seriously. It is also important to think about options outside of drops that are more permanent. E.g. SLT laser vs. Glaucoma eye drops.
Improved patient compliance and reduced treatment times. Understanding the value of compliance and the effects of poor compliance. Fridge magnet reminders.
I haven’t encountered scenarios where patient non-compliance have been due to methods of application. Most have been due to patients forgetfulness especially with their busy schedules. Apps with reminders are very helpful or placing drops at obvious
It may be beneficial however patients with dementia or career usually perform well as it’s within their regime of medications to take. Despite that, some patients already do not want to spend money on drops let alone another device to help administer it. If the drop
They are of high value as it will increase positive patient outcomes and increase patient accountability.
pts have had a few issues with the systane and cationorm bottled drops

Survey Answers

Question 23. What would you like to see in future product interventions regarding assistive eye drop devices, reminder products or general eye health products?

Maybe add a checklist so patients can visualise when drops are due and how their compliance has been.
Reminder products
I would particularly appreciate a device that helped elderly patients with grip issues to put eye drops in and potentially contact lenses. While also reminding them when / how much eye drops to put in would be very useful. Something cheap
Cheap, accessible, easy to use, multifunctional
Better delivery of eyedrops to the eye
Yes, it will interesting to see what out of the box options become available on the market.
Affordable, not too cumbersome to transport/clean/prep, minimum drop waste,
Reminder products are very effective such as alarms help patient with compliance. Also having information sheets to understand the anatomy so patients understand the reason why they’re using the drops
A device that tells you when the last time you administered eyedrops/touched the eye drop bottle so they are not forgotten in a 24hr period.

Interview Questions

	Senior Lecturer in Optometry & Vision Science	Clinical Optometrist/ HDR Student	Optometrist at Optical SuperStore	Optometrist Glaucoma Australia Board Member	Final Year Masters of Optometry Student
Question 1 - General experience, perspective and non-adherence **Can you describe your experiences with patients who struggle to adhere to their prescribed eye drop regimen?**	• *From my experience, those that struggle the most are the ones who have complex medical needs in addition to their eye disease, and they have more pressing medical issues that require their attention. The cost of medications or the side effects of medicated eye drops are common barriers to adherence to eye drop regimens also.* • *Often patients who don't understand what they are for, particularly glaucoma patients in the initial stages of diagnosis, think that if they use the first bottle/month of eye drops their treatment is complete. I feel this relates to communication in the consult room between practitioner and patient to clearly outline the proper use/continuing use of the eye drops. In addition, patients who are older and have trouble with arthritis in their hands struggle to administer the eye drops correctly and may end up not treating accurately (missing their eye, not using everyday due to difficulty instilling drops etc.)* • *Quite common to see patients, particularly those taking them long term or those with mobility issues, having difficulty adhering to eye drop schedules. This can be for dry eye, glaucoma, post-surgery, but my experience probably shows that glaucoma patients struggle the most.* • ***Physical impairment** can be a big issue, particularly given older demographic and co-morbidities such as osteoarthritis or poor muscle tone that impact ability to instill drops* • ***Cost** can sometimes be a factor as well; often if this identified as a barrier, we look at options to overcome this (eg. eligible for concession PBS-subsidised medications? Unit-free dosing might be more cost effective?)* • ***Adverse effects** - given the myriad of potential ADRs with glaucoma medications, some patients discontinue treatment for this reason (eg. cosmetic side effects, eye irritation)* • *Outside of this, **non-adherence tends to occur in patients who have a poor understanding of their condition (eg. lack of symptoms and not understanding the potential blinding impact from glaucoma; misunderstanding that the drops "cure" glaucoma and that they can therefore stop using them once they have a positive response in intraocular pressur**e)* • *Patients who see their optometrists regularly and/or have external support through NFP organisations such as Glaucoma Australia anecdotally seem to report better adherence than those who only see ophthalmology*			

Interview Questions

Question 2 – Understanding health and literacy **From what you've observed, how much does a patient's understanding of their condition and the consequences of not adhering to their treatment plan affect their treatment adherence and compliance?**	• *It does significantly influence their compliance, but I think there are bigger influences on compliance, such as their general health and emotional wellbeing. For patients who have complex systemic health conditions, the eyes can feel like less of a priority. If the patient is feeling hopeless about their health in general, they're less likely to comply with eye drop installation, regardless of the consequences.* • *Significantly in my opinion, if a patient doesn't understand the benefit of instilling the eye drop regularly (or the risk from not doing so), compliance with treatment seems to be more of a challenge in my experience. Even patients who have symptomatic dry eye for example, if they only get temporary relief they get frustrated and stop using the drops altogether, when in reality that's potentially all the drops are going to do, give temporary relief, and therefore management of this condition is ongoing with routine lubricating eye drops. Again communication is key with helping your patient to understand prognosis and adhere to treatment plans - even when symptomatic! Let alone a condition that a patient may be relatively asymptomatic and the condition is slowly progressive (such as glaucoma), if the patient is using an eye drop that stings (which most prostaglandin analogue treatment drops do) and they don't understand why they need to be using it, and they aren't seeing any visual or ocular comfort benefit of using the drop, they may be more likely to cease treatment or be more inconsistent with treatment.* • *Mixed experiences – some patients will be scared of going blind which is enough to get them to take their drops as required, but I have also had other patients, and despite copious written and verbal information they will regularly struggle to administer drops.* • *Very high – as noted above, patients who have a poor understanding of their condition (eg. lack of symptoms and not understanding the potential blinding impact from glaucoma; misunderstanding that the drops "cure" glaucoma and that they can therefore stop using them once they have a positive response in intraocular pressure) tend to not understand the need for ongoing treatment and reviews (eg. might just get their GP to renew their glaucoma medication prescription without formal eye testing)* • *eye drops themselves work alot better at certain times in the day. but for some eye drops alike beta blockers, they are not to be administered at night, and should be used in the morning.* • *for certain eye drops they need to be spaced out, glaucome medications need to be used twice a day. a double up will not have the better benefited. needs to be spaced out and if they arent they will wear off.*

Interview Questions

Question 3 – Patient demographic **In your opinion, what are the biggest challenges elderly and physically limited patients (e.g arthritis, Parkinson's, reduced dexterity) face when administering eye drops (self or assisted)? Do you have any additional insight as to why patients with limited mobility or grip strength are not limited to using standard eye drops?**	• *I don't work with these types of populations a lot, but arthritis would probably be the most common challenge I've encountered (particularly since patients with rheumatoid arthritis are more likely to have severe dry eye).* • *I feel the understanding of why using the drops is important and a challenge in some older patients, especially if not cognitively intact. Having a nursing team and/or family member who lives with the patient can be helpful to communicate the treatment regime with as well. There are some devices on the market to help with dexterity such as Xal-Ease for use with the glaucoma medication Xalatan/Xalacom to help with administration in those who have limited use of their hands.* • *Difficulty squeezing bottle and lining up the drop to get in their eye.* • *Eye drop companies are starting to prioritise long term preservative free bottle designs over ease of use. Some of the newer bottles, particular Systane PF and Cationorm, are very difficult to use. Vials historically have been easiest in my experience but are becoming less used and more expensive.* • *Lack of self-belief (they might say "Oh, I can't do that" without even having tried, or have immediately become reliant on a family member or friend to administer their drops)* • *Not having been shown by a practitioner how to administer eye drops (eg. how much to put in, where to aim – many patients think they have to hit the centre of the cornea when in fact they can be put in pocket of the lower lid). Specific written information can be invaluable here - rather than "use this drop every day", something specific like "Use 1 drop of Xalatan every night at 8pm before bed" can be more useful* • *Practitioner assumption that because a patient has previously successfully used eye drops (eg. lubricants or other glaucoma medications) they will be proficient with administration of all eyedrops; whereas certain bottles have specific nuances (eg. Vizo-PF Dorzolatim is notoriously difficult to squeeze given its preservative-free formulation)* • *the treatment regime of glaucoma can sometimes be categorised as being painful or it stings, and the stinging sensation might make the user think that the treatment isnt working since it hurts, would an information / 'if it stings it is normal' device help prevent users from thinking this.* • *for examples, if they cannot accuately apply the recommended eye drops and they miss several times, thinking they got it but didn't, and you have to inform them that they are missing their eyes and not putting in the eye drops.*

Interview Questions

Question 4 – Emotion of Patient **Do patients with physical limitations, such as elderly users, tend to feel discouraged or lose trust in their treatment when they learn they haven't been accurately administering their eye drops (e.g., missing the eye, thinking drops went in when they didn't, or not applying them often enough)?**	• *Not in my experience, no.* • *I feel patients can get nervous when coming in to an ophthalmologist for their review if they feel that they haven't been as compliant as they know they should be or that they would like to be. I have had some patients who comment that they know they should be using them more but struggle to insert, so we try to talk through different strategies to instill drops more easily. On the flip side, if a patient has done very well with their treatment they often comment 'I've used the drops every day since I last saw the doctor' and are very proud of this. So I think emotional/mental considerations definitely play into compliance as well. I also feel that sometimes a disease progresses, even if using the drops correctly, and this can lead to disheartened patients as they feel they are doing all they can but their condition is still progressing.* • *It's quite difficult for them and I've had patients say to me they're not interested in using drops because they know they will not be able to use them. Sometimes there's an alternative but it is difficult when there isn't. Some patients make the decision they will go blind from glaucoma, rather than struggle with daily eye drops.* • *Patients generally don't like being called out for poor compliance due to their physical incapacities stopping drop use.* • *Those who electively choose not to use drops due to poor attitude will openly admit poor compliance.* • *This could potentially occur, and I believe it is up to the practitioner to educate without shaming or blaming the patient. For example, "I can see you're very close to getting the drop in and you've improved significantly since you first started, however I might give you a few tips to ensure the drop gets in every time".* • *The same goes for non-adherence - it usually is not useful to berate a patient for not using their drops correctly; again, education about why it is important to regularly dose as scheduled (eg. regular use without forgetting minimises the risk of temporary elevations of eye pressure that might cumulatively start to cause harm over many years). Ultimately the practitioner is there to optimise patient outcomes and care, not to discipline them.* • *general reduce hand dexerity is more difficult to administer eye drops , but another thing to add is they might adhere to the frequency and* • *not being able to administer eye drops at the correct doseage and miss their eye and think they got it it, or might be able to and give uo or they might go through many attempts and miss their eye and go through their medication more quickly, they might cease their treatment earlier because they ran out and dont want to pay for another bottle or dont want to come back getting a perscrption. this also decrease their confidence and trust in the whole process,*

Interview Questions

Question 5 - Challenges in adherence **Beyond physical or cognitive challenges, what emotional or psychological barriers (e.g., denial of condition, treatment fatigue) affect adherence? For instance, if glaucoma drops sting or cause discomfort, do patients sometimes interpret this as the treatment not working and lose trust in it? Do you think reminding patients beforehand helps them accept these side effects as normal?**	• *I definitely see a lot of emotional barriers to treatment compliance. For conditions like dry eye, treatment fatigue is common, with patients often needing to instill drops 4 times a day or more on an ongoing basis indefinitely. Dry eye drops are generally just to minimise symptoms, rather than be curative, and patients often don't understand that or get frustrated by this. As I mentioned in a previous answer, I think patients with a low mood due to other health concerns are less likely to comply with treatment due to an overall feeling of helplessness, and/or being overwhelmed from all the other treatments/medications they take for life threatening conditions.* • *I have experienced patients being less adherent to treatments that sting or cause other side effects, particularly glaucoma patients. Explaining the common side effects to patients before treatments starts might be helpful, but from my experience, when patients are starting new treatments there is a lot of new information to remember, and so information like this is often forgotten. I think it's more useful to question the patients directly on side effects at each follow up appointment.* • *There are also cognitive barriers for compliance with treatments for eye conditions that might be asymptomatic - such as glaucoma (early stages) or quite severe dry eye (neurotrophic dry eye). If a treatment is cumbersome, and the patient doesn't experience the consequences of not adhering to treatment, they are understandably less likely to comply.* • *Absolutely, as I mentioned above, particularly with glaucoma treatment these drops can sting, and as glaucoma is a slowly progressive condition and the drops aren't doing anything to restore any lost vision (only prevent further loss) there is no obvious tangible/visual benefit for the patient using the drops. So the fact that they sting and the patient can't notice any benefit from using the drops makes it harder for patients to comply if they are also struggling to get the drops in! Often when first diagnosed, glaucoma patients have been under the impression that if they use the one bottle initially prescribed then they have 'fixed' their condition and stop the drops, when in reality it's a lifelong treatment. So communication between the treating practitioner and the patient is so important. Sometimes when English is not a patient's first language, or we are relying on translators in clinic, I find that sometimes the full message/treatment regime is not accurately communicated. Perhaps a written version (and translated into the patient's first language maybe) would be useful for the patient to take home as well. The prescription bottle will have the script details printed on the bottle, but often these patients struggle with their vision so can't read the tiny writing written on the bottle of drops! So having bigger printed instructions may be beneficial.* • *I have seen both denial of diagnosis and treatment fatigue as non-physical values limiting adherence.* • *I haven't had people stop because they sting* • *I think it's important to discuss side effects (particularly prostaglandins) so they have full informed consent. This could improve compliance* • *All of the above are true – not understanding the potential severity of their condition (in that by the time they actually notice symptoms, they are usually at an advanced stage of glaucoma with no treatment options to reverse the condition) is a big barrier to adherence and can be overcome by good education, be it from practitioner or NFP organisations like Glaucoma Australia* • *Yes, it is absolutely good practice to anticipate and warn about all potential adverse reactions, even if they may seem trivial – as you say, if a drop stings and a patient has been warned about it, they are more likely to accept this (and hopefully the practitioner has given advice on how to manage this). It is also important to encourage patients to return to discuss alternative options if the adverse reactions are intolerable, as opposed to self-discontinuing treatment being lost to follow-up* • *At every follow-up, practitioners should be checking-in with patients their tolerance of treatment so that this never gets forgotten – it is not unheard of what a patient to start developing side-effects to a certain medication months or even years after initially starting them*

Interview Questions

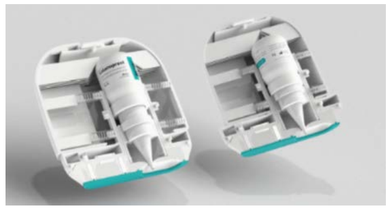
Question 6 - Challenges in adherence **How do you usually recommend patients stick to their eye drop regimen? For example, do you suggest linking it with other medications, or using reminders or routines to help them remember (perhaps a timed wearable vibrational device), especially for users who have difficulty remembering, such as neurodivergent users?**	• *I normally ask them to link regular medications to meal time or some other routine. E.g. teeth brushing or going to bed. After they finish a meal. If it's not a medication that they would take regularly or on an ongoing basis (e.g. they have an eye infection and need intensive treatment for a few weeks) I get them to set alarms on their phone in the consulting room in front of me so I know they won't forget!* • *A lot of the neurodivergent users I see (children and young adults within the Myopia Control Clinic) still live at home with their parents, and so I ensure the parents understand the routine and can follow up on compliance.* • *Yes, often linking with brushing their teeth or last thing before bedtime (in the case of glaucoma drops) or linking with something else in their routine is a helpful way to help patients remember to instill their drops. I have some patients who use an alarm or write it on the calendar. But a wearable vibrational device/setting a reminder on a smart watch etc might be a good way to address this challenge as well!* • *I think patients go well if linking their drop timing to a time of day they do something (i.e. meals, bedtime). I think drops requiring strict timings between them are less successful.* • *Timed devices could be good in those who struggle with remembering at meals or bedtime (and cognitively diverse)* • *With most glaucoma medications being once or twice-daily dosing, I usually recommend tying drop administration in with a meal or other significant activity of the day – for twice daily, this is usually breakfast and dinner (12 hours apart); and for before bed dosing, I usually suggest before turning off the night light or when brushing teeth/showering* • *Phone reminders/smart watch notifications can be useful, depending on the patient's familiarity with such devices*

Interview Questions

Question 7 - Challenges in adherence **Do you think it would be useful for patients to have a progress chart or checklist that shows when drops are due and helps them visualise their treatment progress and compliance? What do you think about if the product provided a feature that allowed the patient to feel comfort, reassurance, confirmation and support that what the patient is doing in regard to adhering to the prescribed medication, is the right thing to do in order to health better their health condition.**	• *There might be certain populations that benefit from visualising their compliance, but I can't say I've encountered many where I thought this approach would be useful (or used).* • *Some kind of feedback mechanism might be useful for some types of patients, such as those new to using medicated eye drops, or those with more complicated regimens. I try to ensure I check compliance to their routines at each follow up appointment, but if there was a way to confirm compliance sooner than a follow up, this might be useful.* • *Post cataract surgery there is a significant number of drops for patients to instill over 4-6 weeks and during this treatment time the number and frequency of drops changes. For example, often post cataract surgery will involve an antibiotic drop instilled 4x daily for 2 weeks, a steroid drop 4x daily for 2 weeks, then taper to 2x daily for 2 weeks and 1x daily for another 2 weeks, and sometimes an anti inflammatory used once daily at night until the bottle runs out! There is a lot happening, so in the practice I worked at we would provide the patient with a calendar of sorts with tick boxes to tick off each drop for each day over the 6 week period and written instructions outlining this in detail. However even with all of these instructions, some patients really struggled to follow the regime, or would lose the calendar, or just stopped the drops after a week when the eye felt better! So again, communication is key.* • *I suppose the suggestion of reassurance could be useful, in terms of perhaps an electronic calendar that gave a reassuring statement with a 'streak of XX days' etc. I feel that our patients who are currently glaucoma/cataract patients are often older and may not be good candidates for this type of technology, however certainly for neurodivergent younger patients or as our younger tech-savy population gets older and faces having treatment for these conditions this could be a useful tool to encourage patients.* • *Progress charts are great, especially in post op schedules, but could also be handy to channel Webster pack like concepts into daily eye drops* - *Having a simple checklist could be good, and would also be a great reminder to discard the drop once it is expired* • *I think any tool that empowers a patient to "take charge" of their condition is worthwhile – sometimes, it can be the seemingly lack of control a patient has on their condition that can be detrimental to understanding and accepting the diagnosis. I think if a tool could support a patient in ensuring good adherence (reminders to instill drops and feedback of successful drop instillation), and at the same time provide a reliable source of written information to re-inforce why they have to be on treatment, this could be very beneficial* • *Home-based eye pressure monitoring (similar to BP monitoring) could be useful here as well (eg. "My optometrist has said that my eye pressures should stay below 15mmHg and I can see that they are, so the drops must be working") but careful patient education would be required (in that there are many other metrics of "successful" treatmnt such as visual fields or optic nerve head assessment)*

Interview Questions

Question 8 - devices and intervention



What do you think of this device, positive and negative? For context, this is a concept design (not in-market) it is to assist users who have glaucoma with stabilising their hand when administering eye drops.

- *Yes this type of 'eye drop aid' device is useful for patients with dexterity issues, and I have recommended these types of devices to patients who I think would benefit from it. They are available on the Glaucoma Australia website (and probably other places too).*
- *I know that some patients use something like this (Xal-Ease) and find it useful, but others don't find it useful. I think it's good to have options to discuss with the patient and give them the opportunity to try devices like this that might make instillation of the eye drops more useful.*
- *- Great idea, just needds to be commercially available and affordable*
- *It certainly looks like a feasible tool, particularly from the point of offering stability. Its size may be slightly off-putting to a nervous patient who doesn't like things near the eyes (compared to the Xal-Ease, fro example). Having something to stabilise the device around the bottom of the eye/cheek might be useful too, to avoid significant tilt. I also would be interested in its universal application – does the device work on all bottles or only certain ones?*

Interview Questions

Question 9 – devices and intervention **What features do you think would make a medical adherence device truly useful and empowering for patients based on their optical diagnosis? For example, the research I have conducted suggests that patients with glaucoma need to administer eye drops four times a day; therefore, a device to remind patients would contribute to medical adherence. Additionally, users with dry eye need warm eye compressions and the frequent administration of eye drops; therefore, a device that can confirm to the user that the eye drop has successfully entered the eye and a feature that assists with educating the user how to massage their eye lids would positively contribute to medical adherence**	• *Often medicated eye drops have to be kept refrigerated, so compliance on the go can be an issue (if they need to dose when not at home)* • *Reminders would be important, but also something that registers their compliance might be more useful, so that doctors can monitor their actual compliance (rather than take patients word for it). For example, a device that actually tracks how many drops have gone into the eyes, and whether they've gone in correctly.* • *I think the reminder feature (such as a vibration/alert) on a wearable device would be fantastic! Or even a pop up on their phone. I feel as though the older patients who are currently the large proportion of people who are affected by glaucoma may not all be engaged with this sort of technology, but certainly as time goes on and the younger generations who are tech savvy become older and are dealing with these issues, a medical adherence app/device would be very useful. I feel like a reassuring message especially after consistent use for so many days would be helpful as well. This would also make it helpful for doctors to track compliance (providing the patient was truthful about entering data that they had actually instilled their eye drops!) in between appointments as well if there was some software linking it back to the treating practitioner.* • *Maybe good linkage to phones so patients get reminders* • *Good idea to link with a drop assistance device too* • *I like the alternate use for dry eye compresses too* • *If it can confirm proper dosage that could be a game changer in managing compliance vs drop efficacy issues* • *The majority of glaucoma drops are once or twice daily, so unsure if market is big enough.* • *Many glaucoma drops are once or twice-daily dosing (although admittedly, if they are on more than one medication they could be using drops up to 4 times a day)* • *As mentioned above, I think if a tool could support a patient in ensuring good adherence (reminders to instill drops and feedback of successful drop instillation), and at the same time provide a reliable source of written information to re-inforce why they have to be on treatment (and yes, how to manage side effects, such as use of lubricants or warm compresses) then this could be very beneficial* • *I sit on the board for Glaucoma Australia and they have lots of information regarding these sort of things - so a device that could "feed-in" to their database and give personalised recommendations based on patient's feedback/adherence/symptoms would be amazing! (eg. Patient is missing a lot of drops → they get sent information from here: https://glaucoma.org.au/i-have-glaucoma/glaucoma-management/treatment-adherence; Patient is getting lots of sore eyes from their drops → they get sent information from here: https://glaucoma.org.au/i-have-glaucoma/living-with-glaucoma/managing-dry-eye-and-glaucoma)*

Interview Questions

Question 10 – devices and intervention **Where do you think there is a main gap in the market of optical products? Or what do current optical products lack that you wish to see in the future, in the scope of users with dry-eye, glaucoma and/ or users who find it difficult to insert and remove contact lenses.**	• *I think that more than eye drops, patients find eye ointments much more difficult to use. But to my knowledge, there are no products that address this!* • *I think spray administration would make life a lot easier for a lot of patients. Currently in the US, there is a device called the Optejet that is being tested and in process of FDA approvals which allows a patient to fill the spray device with any drop (dry eye, glaucoma, etc) and apply the eye drop as a spray. I feel as though this option would help a lot of people who struggle with eye drop application. I am currently investigating this concept in a diagnostic setting in children's eye exams to reduce distress during cycloplegic eye drop administration, and I feel that a lot of adult patients, particularly neurodivergent patients, also really struggle with the sensory overload of the eye drop coming near their eye, and for this reason may be less compliant with eye drops, so a user-filled spray device might be a really useful tool to help improve compliance as well as making it a less stressful experience for the patient.* • *Unsure if there's many gaps to my knowledge* • *Maybe things in sports vision?* • *In an era where AI, machine-learning and deep-learning are all becoming increasingly prevalent, I think we need to be taking advantage of ways that these technologies can enhance patient-care. They will never replace practitioner care but can certainly help with correlating and interpreting large amounts of clinical data, aid with diagnosis and monitoring for progression, and help with the patient journey (see points above on how a patient's behaviour could directly influence what sort of information they are provided)* • *yes, people who dont have phones, it would have to look good and be miminal* • *rings, bracelets are a good idea* • *reminder system, paitent education, system that helps stabilise eye drops, something to confirm to the user they eye drop got in the eye, contact lense insertion, grip stability*

06 week

Overview

Tutor Discussion feedback

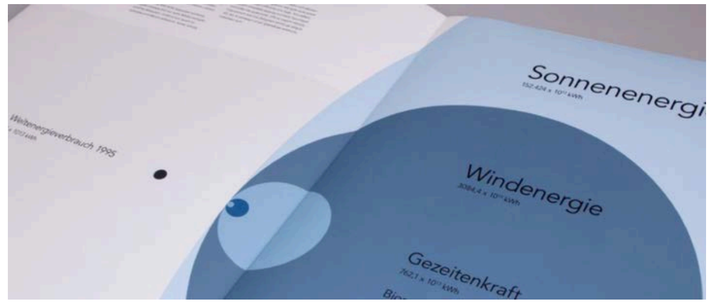
from what i found, design implications... need to be addressed
thses are factors that need to be changed...

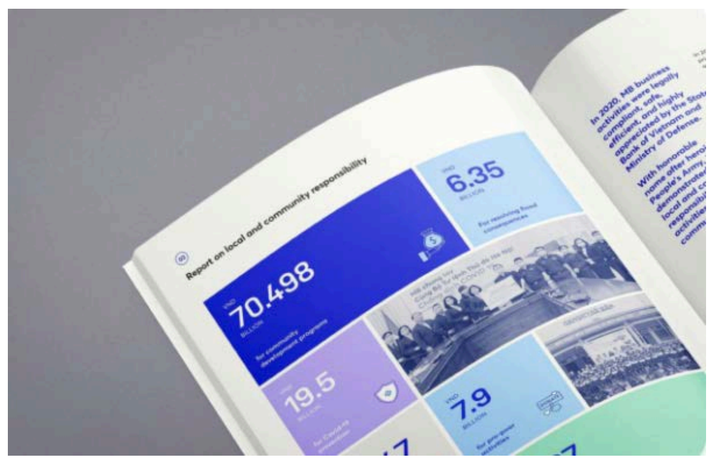
- this is where innovation needs to happen ...

from these factors, medical adherence, demographic type, glaucoma, dry eye etc, design intervention and innovation needs to be made

- i think there is an interesting area where a optometrist suggests that they recommend their paitents to administer their eye treatement and medication at the same time, so it is scheduled together. it is a good point where there is a need for education and support from a health professional providing re-assuance that they dont take two different medications that could potentially cancel or hinder each other out
- A visual progress and self-advocacy progress chart is great - espaically if it was designed to visual with universal language.

Report Mood Board





Report

Research Report

Promoting Medical Adherence for Patients with Dry-Eye and Glaucoma through Treatment Management and Product Assistance

Sophie Montgomery
n11348267

DropAssist

Executive Summary

This project aims to investigate strategies to improve patient adherence to optical treatments, specifically glaucoma and dry eye, thus targeting users with neurodivergence, physical limitations and elderly demographics. Further, this report will research and analyse the underlying barriers to medical adherence, thus specifying gaps and opportunities for future design innovation projects in this space.

Here, the objective is to promote active and voluntary participation by patients in the management of their health through improved treatment adherence and administration.

The conducted qualitative and quantitative research will consider a range of factors contributing to human behaviours and reasoning for why non-adherence to patient posology occurs. Therefore, the following factors will be considered: practical, behavioural, psychological, physical and emotional barriers to adherence and administration to treatment plans.

Ultimately, this report will consider what and how opportunities can be further explored in the scope of design, thus improving treatment adherence through interactive and self-participation design. These mainly include effective reminding systems, educational systems and supportive functions that aim to foster collaborative and consistent engagement between patients, medical professionals, and their therapeutic plans.

Authencity and AI Use Statement

AI Use Statement

I have utilized Generative AI in this report (including ChatGPT) to assist in various ways. The way I have used AI includes: synthesizing data information from my findings and from the literature. AI has been used throughout this project for each section to ensure the information provided is accurate and to reduce word count.

Name: Sophie Montgomery

Student Number: n11348267

Date: 3/09/2023

Authencity Statement

This is to certify that to the best of my knowledge, the content of this report is my own work. This report has not been submitted for any subject or for other purposes. I certify that the intellectual content of this report is the product of my own work and that all the assistance received in preparing this report and sources have been acknowledged.

Name: Sophie Montgomery

Student Number: n11348267

Date: 3/09/2023

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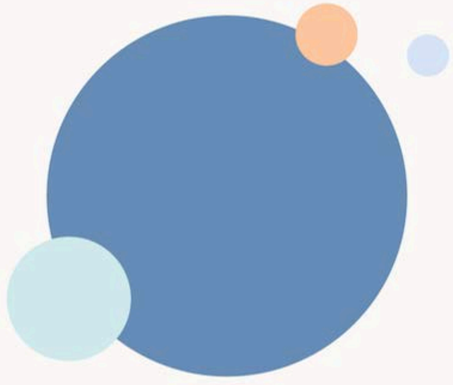
1.0 Introduction



Report

1.0 Introduction

This project aims to explore design opportunities to support voluntary and active participation in managing prescribed optical treatment adherence. The two optical conditions considered here are glaucoma and dry eye disease, as both conditions have similar treatment regimens, including the timed administration of eye drop regimes (Optometry Australia., 2020). The primary patient demographics that will be focused on include elderly adults, neurodivergent individuals, and physically impaired users. Specifically, those with parkinson's disease, arthritis, and low upper mobility, dexterity, strength and grip.

This report will research, examine, and explore the underlying themes and barriers behind patient adherence and non-adherence to prescribed optical treatment plans. Thus informing design implications, gaps and opportunities for future product innovation. Human behaviours related to medical non-adherence will be explored by specifically considering physical, practical, emotional, behavioural and psychological barriers of adherence and administration.

Section 1 will review several academeic literature journals considering the challenges of medical adherence, emotional and physical barriers to adherence concerning glaucoma and dry eye treatment. Additionally, it will benchmark pre-existing design innovations and products concerning the assistance of optical treatment adherence, thus analysing gaps and designing opportunities for future innovation. Section 2 aims to synthesise findings from survey and interview responses from industry expert optometrists to inform and support common keywords regarding barriers to treatment adherence. Based on these findings, Section 3 will then identify themes and design implications to inform future design innovation and solutions to enhance optical treatment adherence.

Aim

This project aims to investigate strategies to improve patient adherence to optical treatments, specifically glaucoma and dry eye, thus targeting users with neurodivergent, physical limitations and elderly demographics.

Research Question

How can patients with physical and mental limitations and barriers (including elderly adults, parkinsons disease, arthritis, and low upper arm dexterity) improve their treatment adherence, be supported and encouraged to actively and consistently adhere to their prescribed optical treatment plans?

Figure 1: Outline of Report Aim and Research Question

Project Structure

Figure 2: Report Project Structure

1.1 Background

Medical Adherence

According to Optometry Australia (2024), the term "medical adherence" refers to "whether patients follow their prescribed treatment plan, including taking medicines at the correct dose and frequency with the correct administration." In the context of optical health, treatment adherence is crucial to the quality use of medicines, as it supports the success of medication regimens and overall patient health. Especially for patients with glaucoma and dry eye disease. (Gast et al., 2019) Intentional and non-intentional adherence are factors that result from inadequate instillation techniques, such as physical and/ or cognitive limitations that prevent patients from improving their optical health condition. (Hovanesiana., 2023)

Optical Conditions

Glaucoma

Glaucoma is "a chronic eye disease which progressively damages the optic nerve, usually from elevated pressure inside the eye, ...leading to irreversible blindness (if untreated)." (Optometry Australia, 2020).

The issue regarding patients with glaucoma who do not adhere to treatment plans is becoming increasingly prevalent globally and especially in Australia. Non-adherence to glaucoma treatment is primarily due to "not noticing the benefits of the medication." (Sayner., 2015) Therefore, the effectiveness of glaucoma medication depends on the adherence to treatment from the patient, which typically includes instilling multiple eye drops and medications several times daily. (Erras et al., 2023)

Ultimately, several academic studies suggest that patients with glaucoma need innovative support and development of robust methods of measuring adherence. For instance, areas of innovation include confirming eyedrop medication usage in real time, thus not relying optical health-care professionals for this information. (Newman- Casey., 2017)

300,000

of Australians have Glaucoma

Figure 3 : Glaucoma Australia (2019)

Dry Eye

Dry Eye disease (DED) is one of the most common clinically observed diseases globally, which is principally treated by eye drops. (Stapleton et al., 2017) 'Dry eye is a multifunctional disease of the ocular surface characterized by a loss of homeostasis of the tear film. ' (Optometry Australia, 2019; Craig et al., 2017)

Ocular symptoms of dry eye are mainly characterized by hindering a patient's quality of life due to abnormal discomfort, stinging, burning and itchiness, which affect daily living. (Gomes., 2018) This may lead to a corneal infection and, in serious cases, may lead to permanent vision loss. (Schaumburg et al., 2001).

72%

of Australians have Dry Eye (2007)

Figure 4: Optometry Australia (2019)

1.1.1 Mental vs Physical Adherence

There are numerous intentional and non-intentional factors that contribute to the non-adherence of optical treatment plans, specifically for patients with glaucoma and dry eye. These mainly include mental barriers concerning emotional, psychological, behavioural and educational challenges. Additionally, physical limitations, including upper-mobility dexterity, age and difficulty with administering eye drops, are all factors that contribute to impacting treatment adherence.

Mental Adherence

'Locus of Control'

The psychological theory, 'locus of control', will be considered to gain a better understanding of how a patient may perceive their own behaviour. This suggests that if a patient improves their treatment through voluntary participation, then this will improve treatment adherence. (Rotter., 1966). Ultimately, this concept is important to consider in the scope of the healthcare system in general and in the optical space, as patients are likely to respond better to treatment adherence when engaging in self-determination and self-efficacy toward their own health outcomes. (Náfrádi et al., 2017)

Patient Empowerment & Trust

Moreover, the emotional pain points when administering eye drops are important to consider and avoid when designing for an innovative patient experience to better adhere to treatment regimes. Therefore, not reinforcing a patient's lived presumptions and feelings regarding their past experiences with treatment adherence, such as shame, embarrassment and hopelessness.(Náfrádi et al., 2017)

Forgetfulness, Education & Neuro-divergence

Additionally, mental barriers to treatment adherence mostly include a lack of adherence to remembering when to comply with treatment regimes. Further, an educated understanding of the consequences when not adhering to treatments. Both barriers will be considered in the scope of patients with neurodivergence and age-related limitations.

Physical Adherence

Eye Drop Application Complications

The main challenges with administering eye drops are due to the following physical limitations;

Parkinsons, Arthrists, Upper-Arm Strenght and Dexterity

Patients with Parkinson's disease and arthritis are found to have great difficulty with self-administering and instilling eye drops into their own eyes due to shaking hands and missing drop doses. (Visani et al , 2015) This further includes patients with limited upper arm mobility, strength, dexterity and grip whereby treatment requirements such as squeezing the eye drop bottles are a major barrier to treatment adherence.

Aiming / Confirmation

A main limitation that most patients face includes not being able to accurately measure and aim where the eye drop meets the eye. (Uchino et al., 2022)

1.2 Benchmarking

As stated in section 1.1.1, the main challenges with optical treatment adherence concern patients with low upper arm dexterity and strength, thus find it challenging and avoid administering aid drops due to it's lack of usability and innovation.

Ultimately, the main emotional and physical factors that contribute to improving optical treatment adherence include its usability, education, accuracy, dignity and trust. Here, these terms are extrapolated per Newman-Casey et al (2015) depiction of *The Most Common Barriers to Glaucoma Medication Adherence* (Appendix 1). Figure 5 stipulates keywords drawn from Section 1's academic research, highlighting a narrower scope of needs and wants for design innovation for the future of optical adherence. Figure 5 is categorized into themes as per its colour code; therefore, multiple circles with the same colour follow the same themes and keywords. Ultimately, the circle positions have been intentionally designed to suggest that the key themes are interconnected and relate to one another in the context of treatment adherence.

Figure 5 : Key Word for Benchmarking Optical Adherence Products

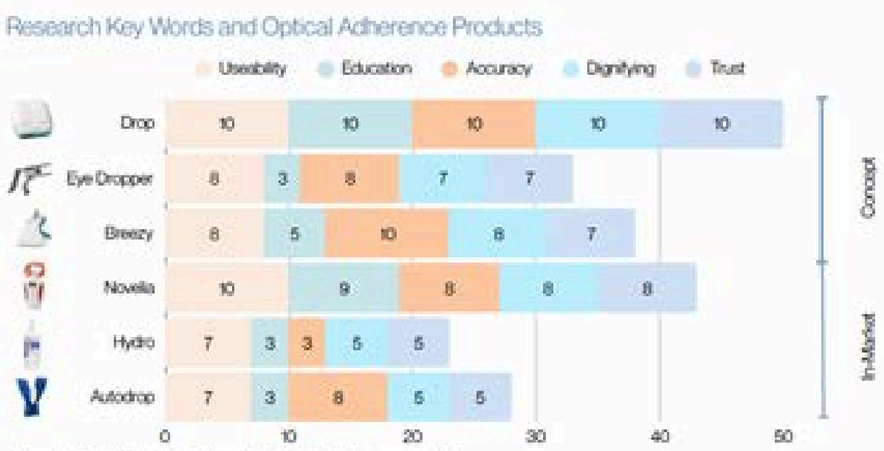


Figure 6 : Key Word for Benchmarking Optical Adherence Products

Figure 6 's benchmarking criteria is based on what was understood in research and judged against the listed features concerning the X-axis of the bar graph. This figure illustrates that most in-market and product concepts that assist the emotional and physical adherence of optical treatment are mostly considered usable and accurate. Therefore, identifying a gap for improving physical adherence needs, as opposed to unprioritised emotional needs. Here, most products have a higher usability rating, which relates to the physical adherence of the products, whereas education and dignity, which are emotional adherence words, are ranked lower. Therefore, this suggests that the current design innovations for optical adherence products do not prioritise emotional features and factors.

In-Market VS Concepts Products for Eye-Drop Stabilisation

Figure 7 aims to illustrate different product concepts and in-market products that exist in the scope of assisting with barriers to optical treatment adherence concerning glaucoma and dry eye disease. These products are compared based on their innovative design choices and human-centred design features. Here, the word 'innovation' is to encapsulate the key words as stated in Figure 5. The comparison of in-market and product concepts reflects the current lack of 'high innovative' optical assistive aids in the market and through design concepts.

Figure 7: Product Matrix of Design Concepts and In-Market Products

Nonetheless, the lack of innovative in-market products also suggests a lack of accessibility to these products. Figure 6 shows that the *drop* product is the most innovative, therefore suggesting there is a gap in accessibility to the 'most' innovative product, not in the market.

Figure 7's product names and further explanation of how these products accommodate both emotional and physical needs are listed per Figure 10's numbering system of products.

Report

1.3 Opportunities and Gaps

Identifying Gaps and Opportunities for Future Design Innovation

Design Concepts

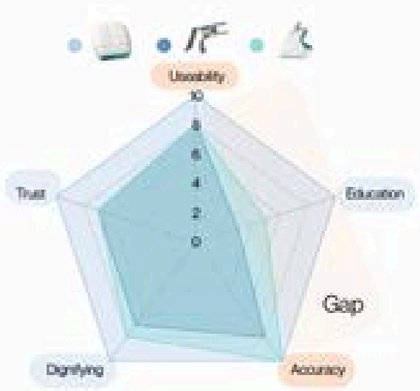


Figure 8: Design Concept Products Radar Graph

In- Market

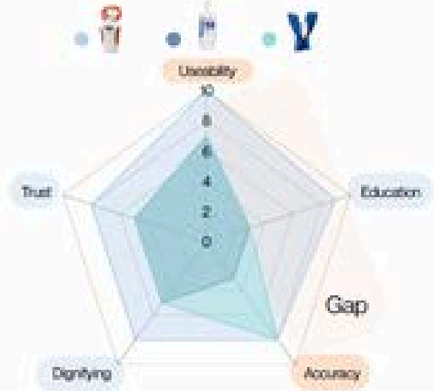


Figure 9 : In-Market Product Radar Graph

Key —— Emotional Adherence Words | Physical Adherence Words

Gap

The main gaps identified from Figures 6 - 9 mainly address that current in-market and design concept designs of optical assistive devices do not address the emotional adherence needs of patients.

Figures 8 and 9 represent a majority gap with products not addressing the educational needs of patients, therefore suggesting a design opportunity to educate patients on their treatment regimes. In this case, educational factors consider reminding users when to administer eye drops at the correct dosage and frequency. Additionally, to encourage users to adhere to treatment regimes, but understanding the consequences of not adhering to prescribed treatment plans, which mainly result in worsening their condition or blindness.

Opportunity

From this, the main opportunities for encouraging emotional and physical treatment adherence includes targeting the emotional needs of patients. By doing so, the physical barriers of patients must be considered and designed innovatively to influence the emotional factors of the patient. For example, by increasing the usability and accuracy of an optical assistive aid, this will influence users to feel less ashamed and embarrassed when they are not able to administer their drops accurately.

Summary

Summary of In-Market vs Concept products Adherence

	Product	In-market or Concept	Emotional Adherence	Physical adherence
1.		Concept/ High	Dignifying, moderately accurate, aesthetic,	Stability, gripibility, automatic squeezing, easy to aim
2.		Concept/ Low	Non-aesthetic, in-expensive materials	Squeezing mechanism is difficult especially with low grip strenght
3.		Concept/ Low	Aesthetic design, but lack of usability hinders emotional durability	Hard to stabilise on nose and head. Difficult squeezing mechanism
4.		In-Market/ High	Reliance to ensure eye drop instills into the eye	Difficult to squeeze around the sides of the product
5.		In-Market/ Low	Not aesthetic, or easy to understand	Not trustworthy squeezing bottle to ensure eye drops instills in eye
6.		In-Market/ Low	Low dignifying features of aesthetic and form	Difficultly gripping and squeezing device whilst aiming

Figure 10 : Summary of Design Concept: and In-Market Products

Summary of Key Words and Benchmarking Products

	Drop	Eye Dropper	Hydro	Novelia
Usability	☑	☑	☑	☑
Education	☑	☑	☑	☑
Accuracy	☑	☑	☑	☑
Dignifying	☑	☑	☑	☑
Trust	☑	☑	☑	☑

Figure 11: Summary of Key Words and Four Innovative In-market and Design Conduct Projects

Figure 11 demonstrates that design concept products consider the emotional adherence needs of the patient, as opposed to in-market products. Ultimately, the benchmarking figures suggest there are current gaps and opportunities for future design innovation in the space for enhancing optical treatment adherence.

Appendix 2 should be referred to understand a deeper analysis of keywords as per Figure 6. Thus, providing context as to how to address the gaps in-market and through concept design, therefore, presents opportunities for innovation regarding features of the device.


07
week

Research
Research Scope
Methodology
Limitations
Future Improvements
Analysis and Findings
Survey
Interview

2.0 Research

Report - Research Scope & Methodology

2.0 Research

As stated in section 1.2, the main gaps and opportunities identified amongst in-market and design concept products concern the emotional and physical aspects of treatment adherence. Therefore, suggesting a greater need for product innovation relating to the following innovative factors: usability, education, accuracy, dignity and trust. (Figure 5)

The main challenges here are understanding these gaps and verifying whether they address the needs and concerns of optical industry experts who understand the lived barriers and limitations of patient adherence.

1. Survey 2.1 Research Scope

Purpose of Survey	To seek a wide range of expertise regarding the priority of the six main themes. For instance, questions related to design interventions informed whether optical experts believed there is a gap, need and opportunity for optical product innovation. The results are to suggest design priorities, requirements and feasibility of ideas as potential interventions.
Survey Participants	A total of 11 survey participants who all completed or are completing their Master's of Optometry Degree at QUT. These include six practising optometrists and five Master's of Optometry Students at QUT.
Data Type	The quantitative data concerns 22 questions with a 1-5 scale (1 being strongly disagree, 3 being neutral, and 5 being strongly agree), which prioritise and address the main matters and themes of patients in this scope. The qualitative data addresses an elaboration on particular topics, including open-ended responses. These responses are then coded into themes per Figure 18.
Limitations	Participants are optometrists/ students, therefore are not the end patient/ user with lived experience. Voluntary participants of the responses link to selection bias regarding all participants receiving their Master's education at Brisbane, QUT.

2. Methodology

Recruitment	The qualitative data set was collected by emailing optometrists/ students from QUT Optometry Clinic and OPSM. The participation in the survey was voluntary and anonymous.
Collection of Data	Google forms • Refer to the 'data type' in the previous table. Refer to Appendix 3 for all Google Forms questions. These responses are then coded into 'data type' themes
Data Type	These questions mostly regarded: demographic considerations including patients with dementia, parkinsons disease, arthritis, upper mobility dexterity and strenght and neurodivergence, education and health literacy of patients, eye drop dosage, and frequency, reminding challenges and aids, gap in the market for assitive eye-drop aids and interventions. Refer to Appendix 4 for coding of data into common themes.
Limitations	Limitations of the data pool concern a lack of a survey aimed at the end primary patients with glaucoma or dry eye disease, or an upper arm mobility disability. There is a notable limitation of data regarding accessing a larger data pool, mostly due to a lack of participant responses and voluntary participation.

Informed from Survey

The Human-Centred Design (HCD) methodology will be adopted here by using convergent mixed-methods and design thinking, in order to understand emotional and physical limitations of treatment adherence.

3. Interview Research Scope

Purpose of Survey	The purpose of the semi-structured / written interviews is to gain expert insights into the challenges that patients with glaucoma and dry eye disease face from the perspective of the optical health care provider.
Survey Participants	
Data Type	Qualitative data will be deconstructed with noting key words linking to section 1.1 and 1.2.
Limitations	Similarly to Section 2.1 Limitations.

4. Methodology

Recruitment	Refer to Interview methodology
Collection of Data	The shared Google Doc included 10 written semi-structured interview questions for expert optometrists to type out. The qualitative analysis in Excel includes qualitative coding (content analysis). Refer to Appendix 5.
Data Type	The questionnaire consisted of the following topics with approx two questions per theme: general experience, perspectives of patients with non-adherence to glaucoma and dry eye disease treatment, understanding health and literacy, patient demographics, emotions of the patient, challenges in treatment adherence, and device and future intervention.
Limitations	• Future improvements for collecting data include outreaching to different nationalities, regional groups and inter-state patients with glaucoma for a more spread data collection. • The data collected is also limited to the Australian population, specifically Brisbane, all experts received their education from the QUT Optometry Clinics. (This does not consider that a few optometrists have experience overseas regarding their expertise, more so that their patients are mostly from Australia and are Australian certified Optometrists).

Report - Quantitative Data

2.2 Analysis & Findings

As per Section 2.0, this analysis will depend on expert quantitative and qualitative data regarding the advice of Optometrists and a Master's of Optometry student. The following survey results will reflect the mean, median and mode for each survey theme/ graph, to best determine the common consensus of each topic. The themes are based on the findings in each section and sub-section of the report, and in the survey. The x-axis is the question theme, and the y-axis is the 1-5 scale.

2.2.1 Survey Results

Understanding Health & Literacy

Figure 12: Understanding Health & Literacy Survey Results

Refer to Appendix 6.1, the mean for A. is 4.72, B. is 2.6, and C. is 3.63, overall median of 3.66.
Figure 12 shows that 'complex regimes' do not necessarily mean there will be poor compliance by the patient. Nonetheless, 'treatment education' is strongly agreed to be a main factor in encouraging voluntary participation in treatment care.

Section 2.2.1 is to be analysed by coding themes (Appendix 6)

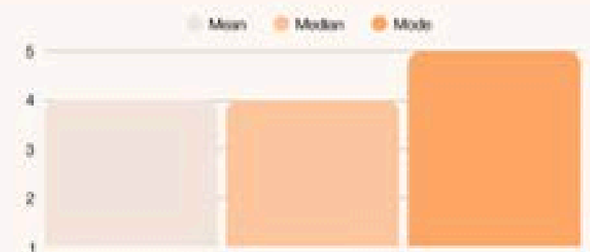


Figure 14 : Patient Demographic Survey Results

Refer to Appendix 6.3, the overall mean is 4.36. Therefore, there is a strong correlation between older patients and an increase in non-adherence to treatment. Thus addressing pain points elderly patients usually experience, including higher prevalence of Parkinson's disease, arthritis, limited grip strength and forgetting treatment regimen and health consequences to not adhering to treatment.

Patient Demographic

2.0 Research

Mental Limitations

Figure 13: Mental Limitations of Patient Survey Results

Refer to Appendix 6.2, the mean for A. is 4.18 and B. is 4.63 with an overall mean of 4.4.
Figure 13 shows that complex treatments are strongly agreed to be more difficult to adhere to if the patient has mental barriers. Therefore, it suggests an opportunity for designing a reminder for patients to administer eye drops at their prescribed regimen.

21

2.0 Research

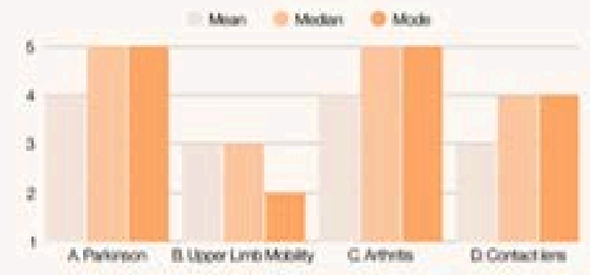


Figure 15: Physical Patient Limitations Survey Results

Refer to Appendix 6.4, the mean for A. is 4.54, B. is 3, C. is 4.18, and D is 3.72, with an overall mean of 3.86. Opportunities for designing for better stabilising a patients arm/ hand for better accuracy of eye drop administration.

Physical Limitations

22

Report - Quantitative & Qualitative Data

Treatment Adherence Challenges

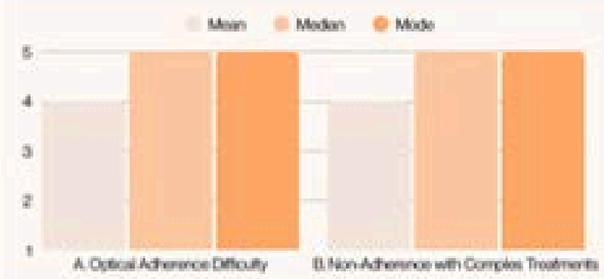


Figure 16 : Challenges with Treatment Adherence Survey Results

Refer to Appendix 6.5, the mean for A. is 4 and B. is 4.18 with an overall mean of 4.09. This graph shows that the more complex the treatment regime is for a patient with glaucoma and dry eye disease, the more non-adherence there is with their treatment plan. Therefore, there is a need for treatment plans to be easily understandable and adhered to.

Devices & Intervention

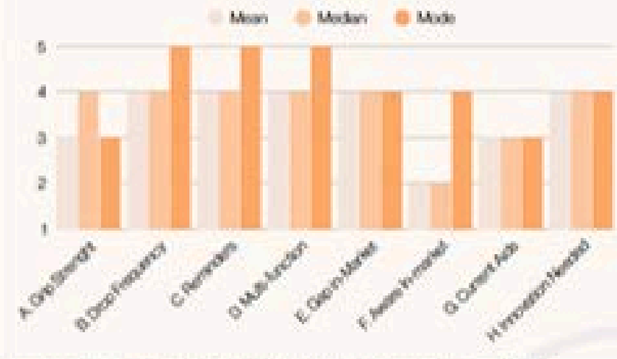


Figure 17 : Gaps and Opportunities for Future Device Intervention Survey Results

Refer to Appendix 6.6, the mean for A. is 3.72, B. is 4.27, C. 4.09, D. 4.09, E. 4.18, F. 2.63, G. 2.90 and H is 3.81 with an overall mean of 3.71.

Due to having a large range of questions, the overall 3.7 mean average is assumed not to be a true reflection of whether device intervention is strongly agreed to be an opportunity for innovation. Nonetheless, reminders, drop frequency and multi-functional devices are the highest opportunity for innovation.

Question 23. What would you like to see in future product interventions regarding assistive eye drop devices, reminder products or general eye health products?

Future Product Intervention & Gaps

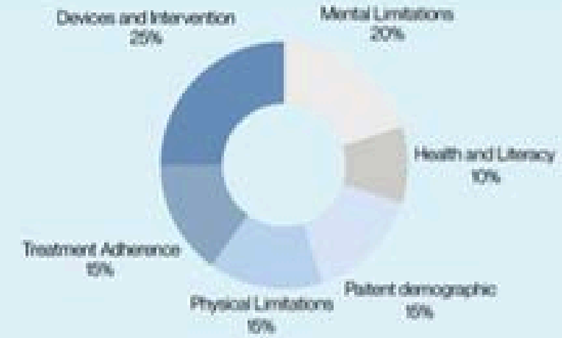


Figure 18: Future Product Intervention & Gaps Qualitative Survey Results

Summary of Survey Data

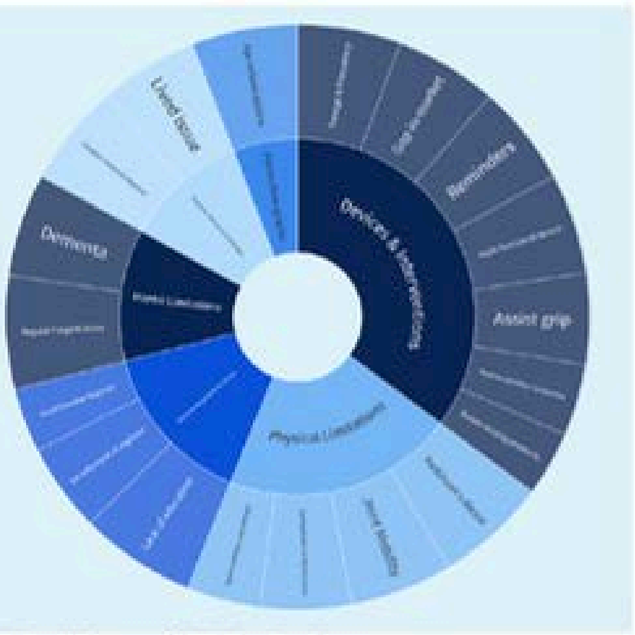


Figure 19 Summary of Quantitative Survey Data

Refer to Appendix 4 for data coding, and other qualitative data results including Question 22, what that means for design implications. Here, the data is somewhat even distribution for the need and importance of each theme. The themes with a higher percentage rate are 'strongly agree' responses from the survey. This is supported by the summary pie chart diagram as per Figure 19, which provides also provides examples of factors relating to the main themes of treatment adherence.

Report - Interview Responses

2.2.2 Interview

The interview findings are to better understand what optical experts observe in practice. These responses are purposely not analysed in depth, keywords and phrases will be drawn out to show the main themes. Quotes are categorised into participant responses and as per Section 2.2.1's themes, refer to Appendix 7.

Senior Lecturer in Optometry & Vision Science	Clinical Optometrist/ HDR Student	Optometrist at Optical SuperStore	Glaucoma Australia Board Member	Masters of Optometry Student

Figure 20 : Optometrist Participants in Interviews

Understanding Health and Literacy

"I have had some patients who comment that they know they should be using them more, but struggle to insert, so we try to talk through strategies to instil drops more easily."	Patients recognise non-adherence and struggle to insert eye drops.
"Often patients don't understand what they are for, particularly glaucoma patients in the initial stages of diagnosis, that they think if they use the first bottle/ month of eye drops their treatment is complete."	Not understanding severity of glaucoma condition.
"Communication is key with helping your patient to understand prognosis and adhere to treatment plans"	Optical practitioner and patient communication is important
"I have had other patients, and despite copious written and verbal information they will regularly struggle to administer drops.	Written and verbal information is ineffective for treatment adherence
"Misunderstanding that the drops "cure" glaucoma.. therefore stop using them once they have a positive response.. tend not to understand the need for ongoing treatment and reviews"	Misunderstanding of treatment outcomes
"If patients do not understand their method of treatment it is the step-by-step process then they tend to ignore the consequences or seriousness of Glaucoma"	Mis-understanding that Glaucoma is chronic and not a temporary disease and treatment

2.0 Research

25

Mental Limitations

"Those that struggle the most are the ones who have complex medical needs in addition to their eye disease."	Patients with complex needs struggle more
"" I've used the drops everyday since I last saw the doctor' and are very proud of this. I think emotional and mental considerations definitely play into compliance."	Emotional and mental considerations influence adherence
" I have seen both denial of diagnosis and treatment fatigue as non-physical values limiting adherence."	Denial of diagnosis and treatment fatigue
"Lack of self-belief (might say "oh, I can't do that" without even having tried, or immediately reliant on a family member or friend to administer drops"	Lack of self-belief

Patient Demographic

"Patients who are older and have trouble with arthritis in their hands struggle to administer the eye drops correctly and may end up not treating accurately "	Arthritis & older patients struggle to administer
"I feel the understanding of why using the drops is important and a challenge in some older patients, especially if not cognitively intact."	If not cognitively intact
"Physical impairment can be a big issue, particularly given older demographic and co-morbidities such as osteoarthritis or poor muscle tone that impact ability to instil drops"	Osteoarthritis or poor muscle tone

2.0 Research

26

Report - Interview Responses

Physical Limitations

"Difficulty squeezing bottle and lining up the drop in their eye." → Squeezing and lining up bottle

"I've had patients say to me they're not interested in using drops because they know they will not be able to use them." → Know and not interested with using bottle

"Patients generally don't like being called out for poor compliance due to their physical incapacities stopping drop use." → Don't like being shamed or embarrassed about physical incapabilities

Emotional Limitations

"I definitely see a lot of emotional barriers to treatment compliance. For conditions like dry eye, treatment fatigue is common, with patients often needing to instill drops four times a day or more on an ongoing basis indefinitely." → Treatment fatigue

"Dry eye drops are generally just to minimise symptoms, rather than be curative, and patients often don't understand that or get frustrated by this. As I mentioned in a previous answer, I think patients with a low mood due to other health concerns are less likely to comply with treatment due to an overall feeling of helplessness, and/or being overwhelmed from all the other treatments/medications they take for life threatening conditions." → Chronic diseases are not curable, which is frustrating, helpless, overwhelming and not understood

"I think any tool that empowers a patient to 'take charge' of their condition is worthwhile - sometimes, it can be the seemingly lack of control a patient has on their condition that can be detrimental to accepting diagnosis." → Patients need feeling of control in their treatment

Challenge in Treatment Adherence

"Some patients make the decision they will go blind from glaucoma, rather than struggle with daily eye drops." → Go blind rather than struggle with drops

"The fact that they sting and the patient can't notice any benefit from using the drops make it harder for patient to comply if they are also struggling to get the drops in." → Not noticing benefits of treatment contributes to non-adherence

Devices and Intervention

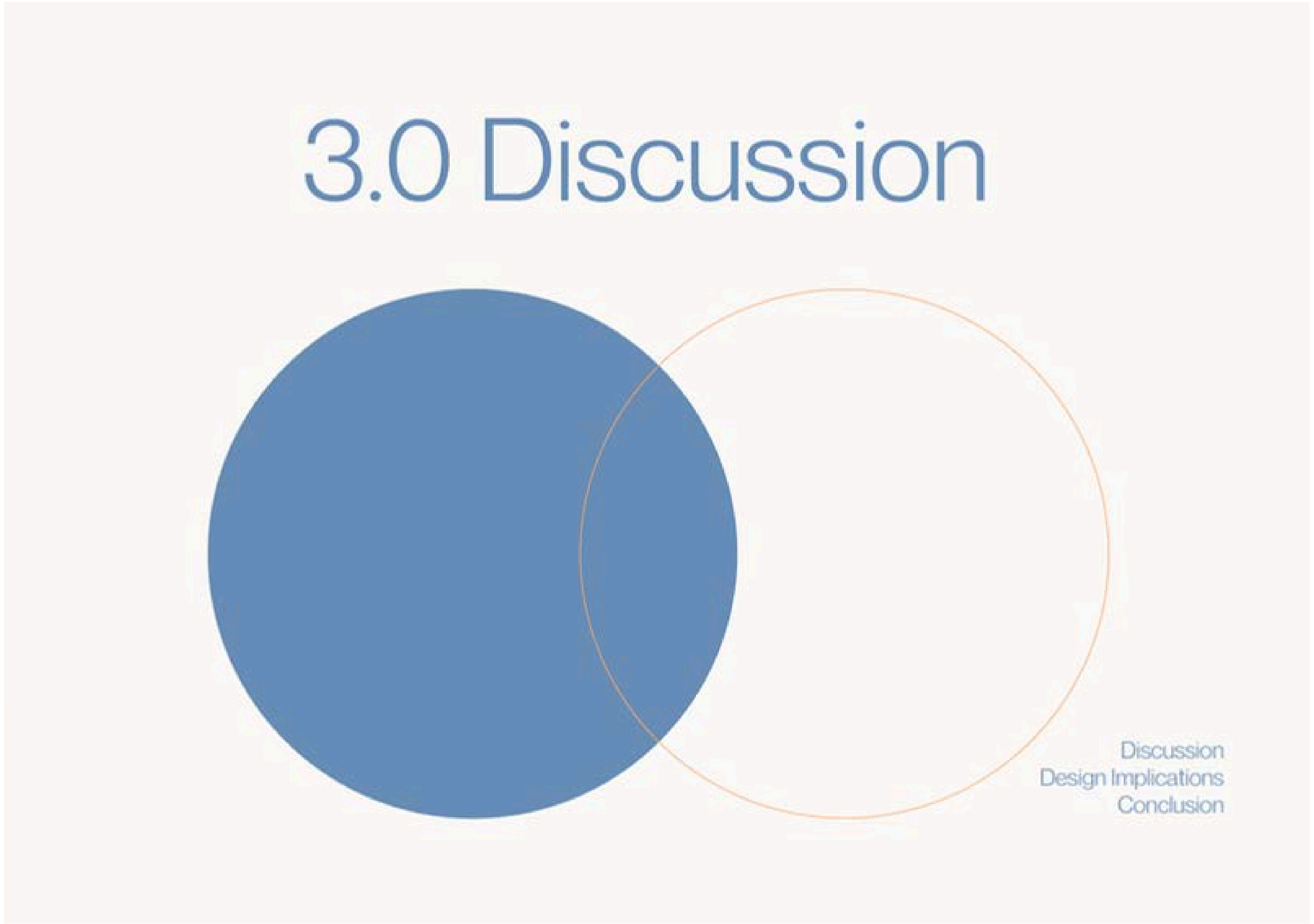
"Reminders would be important, but also something that registers their compliance might be more useful, so that doctors can monitor their actual compliance." → Registering compliance to optical professional

"A reminder system, patient education, system that helps stabilise eye drops, something to confirm to the user they eye drop got in the eye, contact lense insertion, grip stability are great ideas" → Reminder system, patient education, stabiliser and confirmation

"I think if a tool could support a patient in ensuring good adherence to (reminders to instill drops and feedback of successful drop instillation), and at the same time provide a reliable source of written information to re-inforce why they have to be on treatment, this could be very beneficial." → Reminder and feedback of successful drop instillation and re-inforcement for treatment checklist

Summary

Overall, there is a clear issue with patients with glaucoma, dry eye disease and adherence from the expert opinions and optometrists in Brisbane, Australia. Note, the number of quotes for each theme does not reflect their level of importance to this topic.


3.0 Discussion
Discussion
Design Implications
Conclusion

Report - Discussion & Design Opportunity

3.0 Discussion

Literature and Academic Journals

Section 1.1 provides an initial understanding of medical adherence in the scope of glaucoma and dry eye disease. This outcome suggests that without voluntary participation and adherence to eye drop administration regimes, blindness or severely impacted quality of life can result. Further, section 1.1.1 emphasises the main emotional and physical barriers patients face that contribute to non-adherence to treatment. Therefore, these barriers are gaps in future design innovation concepts, which highlights an opportunity to design for improving the quality of life for patients with glaucoma and dry eye disease.

Benchmarking Products

Section 1.2 identified, analysed and categorised five key words/ themes, including usability, education, accuracy, dignity and trust from Casey et al (Appendix 1). From these keywords, in-market and design concepts were compared against each other depending on whether they suited the keywords. It was determined that there is a gap for design innovation for both in-market and design concept products. Whereby, there is a clear opportunity for both markets to innovate products that combine physical assistance and lower emotional barriers to better adhere to treatment plans.

Survey & Interviews

Section 2.2.1 analysed a survey including 11 optical professionals with experience addressing patients with emotional and mental barriers to treatment adherence. There was a clear correlation that all optical industry professions agree that adherence to treatment does exist with education, remembering, and the accuracy of drop administration are all gaps and opportunities for design innovation.

Section 2.2.1 reiterates from five independent interviews by highly educated optical professionals with four optometrists, agreeing that a patient's need to understand their treatment regimen is very important for influencing better treatment adherence. Additionally, the emotional and physical barriers to administering eye drops are extremely important. Whereby some patients are unable to adhere to their treatment due to physical limitations, for example, the inability to squeeze an eye drop bottle independently and feeling embarrassed. Ultimately, this clearly links to the 'locus of control' theory as stated in Section 1.1.1 and is supported by Inez Hsing agreeing there is an opportunity for innovation in this space, "I think any tool that empowers a patient to 'take charge' of their condition is worthwhile - sometimes, it can be the seemingly lack of control a patient has on their condition that can be detrimental to accepting diagnosis."

Identified Themes & Gaps

Based on my previous findings, this re-inforces that there is an opportunity for marketable, affordable and accessible devices that limit the emotional and physical barriers of treatment adherence specifically designed for glaucoma and dry eye patients. Thus, innovating a product experience to address a clear gap for accessible eye drop assistive devices that educate, remind and provide accurate eye drops.

Identified Themes

Figure 21 addresses the key findings and themes identified from Sections 1.0 and 2.0 in the scope of treatment adherence. From this, seven design opportunities for future design implications have been identified.

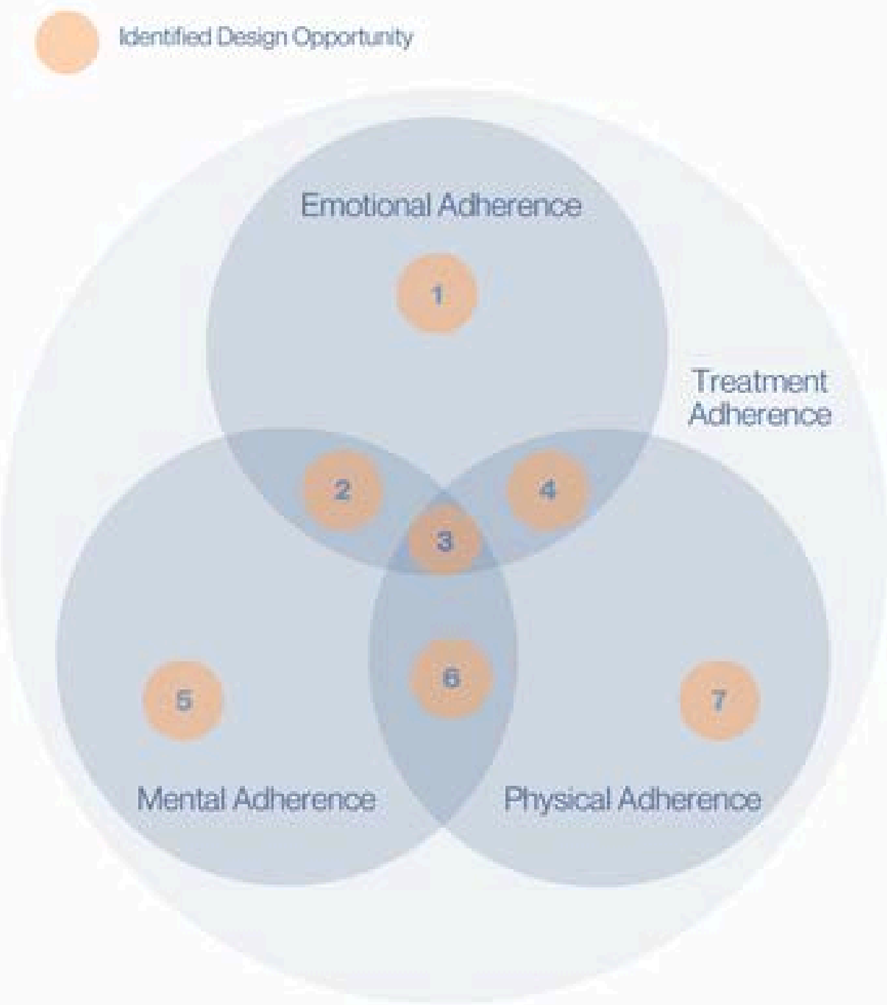


Figure 21: Identified Themes for Design Implications and Opportunities

Report - Design Implications & Conclusion

3.1 Design Implications

The following headings are design implications to be addressed in future innovation projects per Section 3.0 of this report. These design implications aim to address the gap in design innovation, addressing emotional, mental and physical barriers to optical treatment adherence.

Treatment Adherence

The issue of optical treatment adherence is the overarching criterion that is advised to be included in the design direction I take toward the concept and prototyping phases. The main opportunities presented concern emotional, mental and physical adherence as directed by expert optical feedback, which encompasses and considers tertiary barriers as well. For instance, emotional barriers relate to psychological barriers.

Overall, based on the identified themes and gaps from sections 1 and 2 of the report, seven identified design opportunities are identified as per Figure 21. This suggests that patients may only have one themed barrier towards their optical treatment adherence, whereas another participant may have two or three. For example, a patient may have emotional and mental barriers to adherence due to their neurodivergence, therefore feel guilty and ashamed when forgetting to administer their eye drops at the correct frequency.

Goal

Emotional Adherence

Emotional adherence includes psychological, cognitive and motivational barries. These specifically include feelings alike dignity, shame, trust, relaibility, embarrassment, frustration and low confidence.

From this, the design implications with designing emotionally conscious considerations indirectly, would allow an opportunity for patients to feel dignified, and self- empowered when engaging in independent participation in treatment adherence.

1, 2, 3 & 4

Mental Adherence

Mental Adherence concerns neurodivergent individuals, dementia, regular memory issues, depression and anxiety. Therefore, addressing barriers to forgetfulness, medical education and literacy, and other mental challenges. Considering this, the gap to address here would be preventing patients from forgetting to administer eye drops frequently at the correct dosage. The design implications include reminding patient and re-inforcing emotional feelings of encouragement towards their treatment progression.

2, 3, 4, & 6

Physical Adherence

Physical adherence addresses patients who live with physical barriers, where they are unable to administer their own treatment independently. This includes patients with parkinsons, arthritis and upper arm mobility and strength issues. The main gap here is allowing independent and accurate administration of eye drops. The opportunity presented includes allowing the patient to feel empowered, dignified and not ashamed whilst avoiding taking participating in their treatment.

3, 4, 6, & 7

4.0 Conclusion

In conclusion, this report highlights a clear opportunity for design innovation regarding optical assistive devices that support accurate and dignified eye drop administration for patients with mental, emotional and physical limitations. Treatment adherence is the key overarching criterion, with glaucoma and dry eye disease as prevalent diseases that affect the lives and daily living of hundreds of thousands of Australians each year. (Optometry Australia, 2020) Treatment adherence to these conditions has been identified as a real and lived challenge for patients with mental, emotional and physical limitations to adherence.

Moreover, Section 1 examined condition-specific barriers to treatment adherence, thus introducing the psychological theory of the 'locus of control', to explain how a patient may perceive their own behaviour and reward with improved treatment adherence. (Rotter, 1966). Ultimately, this concept aims to be used to encourage an individual's perception of control over their health and treatment, thus better adhering to treatment regimes.

Secondly, based on Section 1 findings, Section 2 built on the literature research thus revealing gaps in usability, accuracy, education, trust and dignity of product innovation.

Lastly, Section 3 formulated a conclusion based on the report findings and explored strategies to promote medical adherence through interactive, trustworthy and voluntary participation. Such as effective reminding, educational systems and supportive handles that foster a collaborative and supportive journey for patients, medical professionals and their therapeutic plans. (Kowing et al., 2010) Ultimately, optical treatment adherence is a lived issue and market with great need for design innovation to best treat the health and symptoms of glaucoma and dry eye.

08 week

Patient Journey - Administered

01

Forgetting to administer eye drops

Wearable device to remind user

02

Put in eye bottle type or check expiration date

Interchangeable eye drop bottles

03

Make sure device is charged

Charging dock

04

Line up eye drop device to eye

Ensure accuracy so the drop can be properly adminstered, the patient is notified with a green light when bottle is lined up at the correct angle

05

Track Success

patient is reassured that eye drop was successfully administered in the eye

06

More eye drops

Patient is notified of further administration regimes they need to adhere to, such as replacinng drop solution

07

Checklist

Patient is encourgaed and praised for adminstering eye drop

Design Implications Iteration

Mental Adherence

neurodivergence , anxiety , depression, behavioural
neurodivergent individuals, dementia, regular memory issues, depression and anxiety.
Design opportunity, preventing patients from forgetting to administer eye drops (at the prescibed time) frequently at the correct dosage. Design implications include reminding patients and re-inforcing emotional feelings of encourage towards their progression

On-device “show me” animation / app clip for technique (blink timing, bottle angle): reduces technique errors.

Streaks & milestones (weekly badges, “X days protected”): builds habit reward loops without gamifying illness.

Universal lanague

Personalised “why it matters” tiles (short, patient-friendly cards that explain glaucoma/dry eye progression): links action to meaningful outcome.

Multi-med support (1–4 daily, multi-bottle): schedules consolidate and sequence drops; prevents overlap.

Goal setting (patient picks a reminder window + preferred feedback style): restores agency and perceived control.

- Opt-in sharing: sends adherence summaries to the practitioner between visits.
- Trigger-based education:
- – Missed doses → auto-send adherence tips link (treatment-adherence education).
- – Sore eyes → auto-send dry-eye management link (lubricants, warm compress).
- Provider dashboard (simple trend + notes): supports “communication is key” without overburdening clinics.

- I think any tool that empowers a patient to “take charge” of their condition is worthwhile – sometimes, it can be the seemingly lack of control a patient has on their condition that can be detrimental to understanding and accepting the diagnosis. **I think if a tool could support a patient in ensuring good adherence (reminders to instill drops and feedback of successful drop instillation), and at the same time provide a reliable source of written information to re-inforce why they have to be on treatment, this could be very beneficial**

Reminder device

Progression chart/ checklist

consequence educator regarding non-adherence

- Home-based eye pressure monitoring (similar to BP monitoring) could be useful here as well (eg. “My optometrist has said that my eye pressures should stay below 15mmHg and I can see that they are, so the drops must be working”) but careful patient education would be required (in that there are many other metrics of “successful” treatmnt such as visual fields or optic nerve head assessment)

- Vibrational remindeer . Adaptive reminders (wearable vibration, bedside light pulse, phone pop-up): matches patient’s tech comfort; frequency auto-adjusts to missed doses

If it can confirm proper dosage

dosage educator

treatment educator

Having a simple checklist could be good, and would also be a great reminder to discard the drop once it is expired

Design Implications Iteration

Emotional Adherence

psychological , cognitive, motivational , feelings
Design implications include designing for the emotions of patient, conscious considerations directly. This includes opportunities for patients to feel dignified and self-empowered when engaging in independent participation in treatment adherence.

Gentle success feedback (soft haptic + chime + green light): confirms correct instillation → reduces anxiety and second-guessing.

Affirming micro-copy (“Nice work—your vision health is protected today”): reinforces self-efficacy and dignity after each dose.

Calm mode (breathing LED + countdown): lowers anticipatory stress for patients who fear stinging or eye contact.

Many glaucoma drops are once or twice-daily dosing (although admittedly, if they are on more than one medication they could be using drops up to 4 times a day)

- **so a device that could “feed-in” to their database and give personalised recommendations based on patient’s feedback/adherence/symptoms would be amazing! (eg. Patient is missing a lot of drops → they get sent information from here:** https://glaucoma.org.au/i-have-glaucoma/glaucoma-management/treatment-adherence; Patient is getting lots of sore eyes from their drops → they get sent information from here: https://glaucoma.org.au/i-have-glaucoma/living-with-glaucoma/managing-dry-eye-and-glaucoma)

educator function

accuracy reminder

educatingside effects of treatment

a tool could support a patient in ensuring good adherence (reminders to instill drops and feedback of successful drop instillation), and at the same time provide a reliable source of written information to re-inforce why they have to be on treatment (and yes, how to manage side effects, such as use of lubricants or warm compresses) then this could be very beneficial

- It certainly looks like a feasible tool, particularly from the point of offering stability. Its size may be slightly off-putting to a nervous patient who doesn’t like things near the eyes (compared to the Xal-Ease, fro example). Having something to stabilise the device around the bottom of the eye/cheek might be useful too, to avoid significant tilt. I also would be interested in its universal application – does the device work on all bottles or only certain ones?

Design Implications Iteration

Physical Adherence

Unable to administer their own treatment independently. This includes patients with parkinsons disease, arthritis and upper arm mobility and strength issues.
The main gap here is encouraging independent and accurate administration of eye drops.

The opportunities presented include allowing the patient to feel empowered, dignified and not ashamed, whilst allowing patients to take part in their treatment.

Wearable clip that mounts the applicator to glasses frames → bring eye to device, not device to eye

Dose sensor (flow/optical) confirms drop delivered; logs adherence streaks (optional share with clinician).

Large-print card and on-device icons (multilingual).

Accepts interchangeable cartridges (adapter for Novelia-type multidose bottles), delivering consistent volume per actuation.

Dock & lean mode (countertop stand): user leans face to the stabiliser; press large paddle → dose.

Mass-spring micro-dampers inside the applicator head to filter high-frequency tremor.

Hands-steadying without grip strength: guide the head/hand instead of asking the hand to be steady.

Zero-squeeze, low-force actuation: metered pump/spray (compatible with multidose cartridges such as Nemera Novelia), triggered by a large paddle/rocker, foot pedal, or gentle chin press.

Accurate, consistent drop volume with contamination control (one-way/valved path, protective tip cap).

Lightweight + ergonomic (≤120 g handheld) with large, soft contact surfaces and no “fine pinch” motions.

Soft nose bridge + cheek pads create a 3-point contact so the device—not the hand—stabilises alignment.

A shallow eye aperture sets standoff distance and angle; IR/proximity sensor prevents tip contact.

Arm stabiliser for shaking

Not encouraging gripping movements

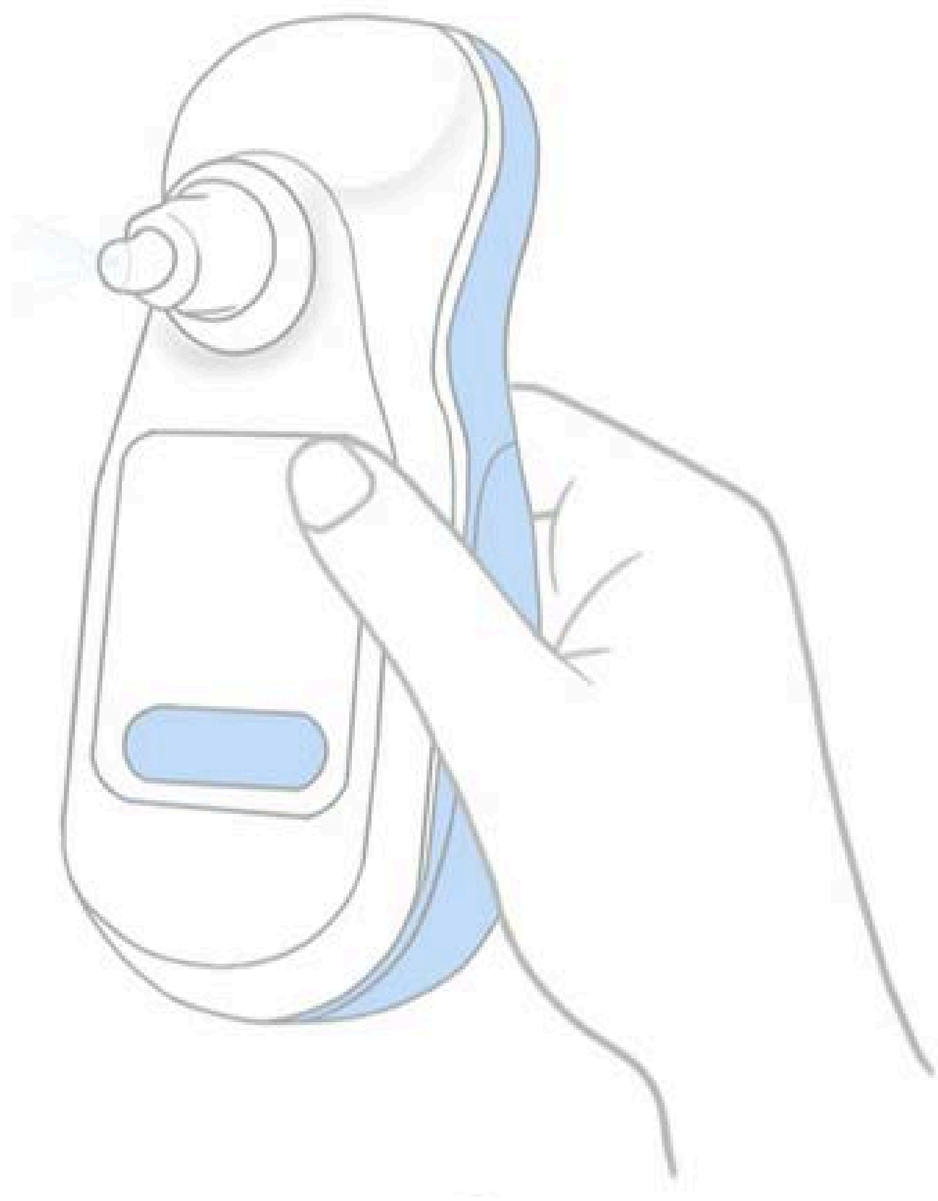
Supportive gripping/ handling

Low weight device for low upper arm strenght

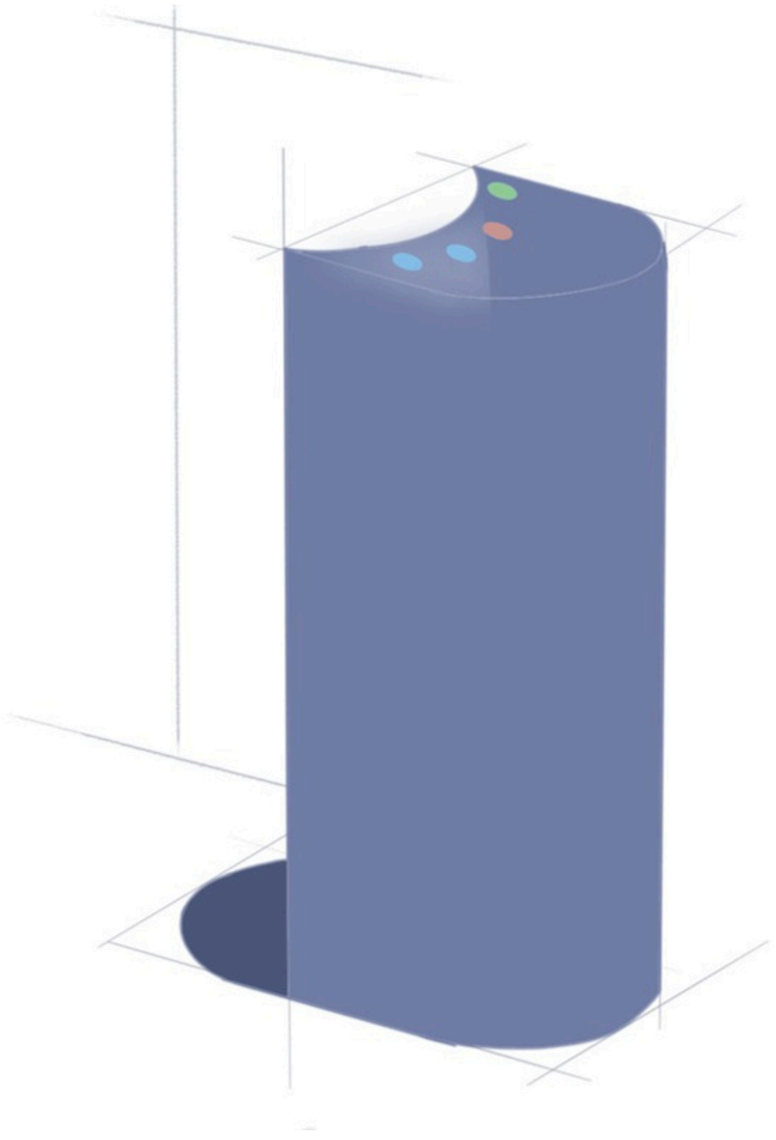
Not bottle squeezing | mechanical mechanism

Dignity first: discreet cues, success confirmation, and no “error/shame” language.

Sketch and Chat GPT Inspo

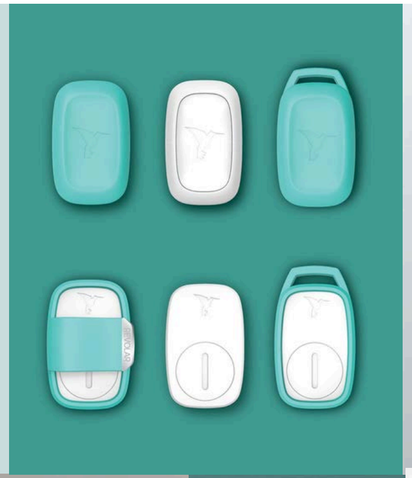


Sketch Context and Kit



Mood Board







Concept -


ID 7 - CAPSTONE
A01 | Visual Concepts
DROP - ASSIST
Promoting Medical Adherence for Patients with
Dry-Eye and Glaucoma through Treatment
Management and Product Assistance
PRESENTED BY
Sophie Montgomery
n11348267
12/09/2025

Concept - Project Overview

ID7 | PROJECT OVERVIEW
Drop Assist

12/09/2025
SOPHIE MONTGOMERY

PROJECT OVERVIEW

A.

Aim

Enhance patient adherence to optical treatments, particularly for glaucoma and dry eye, by targeting users with neurodiversity, physical limitations, and elderly demographics. Considering the underlying barriers to medical adherence, specifying gaps and opportunities for future design innovation projects in this space.

Objective

B.

Here, the objective is to promote active and voluntary participation by patients in the management of their health through improved treatment adherence and administration.

2

ID7 | PROJECT OVERVIEW
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OPTICIAL CHALLENGE

Glaucoma & Dry Eye	→	Treatment Non-Adherence	→	Blindness & Lower Quality of Life
Optical Condition		issue with Not Administering Prescribed Eye Drops		Consequences

C.

Research Question

How can patients with physical and mental limitations and barriers (including elderly adults, parkinsons disease, arthritis, and low upper arm dexterity) improve their treatment adherence, be supported and encouraged to actively and consistently adhere to their prescribed optical treatment plans?

3

Concept - Identified Themes & Key Words

ID7 | PROJECT OVERVIEW
Drop Assist

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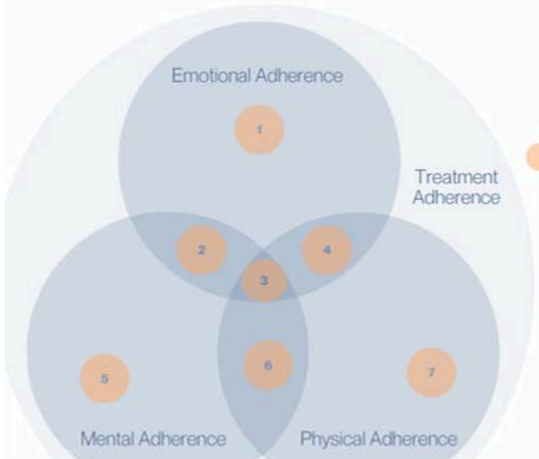
IDENTIFIED THEMES



Seven design opportunities identified for design implications and innovation

Identified Design Opportunity

The psychological theory 'locus of control' will be considered to gain a better understanding of how patients may perceive their own behaviour.

Suggesting that if patients improve their treatment through voluntary participation, then this will enhance treatment adherence.

4

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INNOVATIVE FACTORS

1 TRUST
- Side-effects
- Self-care
- Shame

2 DIGNIFYING
- Empowering
- Encouraging
- Embarrassment

3 EDUCATION
Emotional & Mental
- Confirmation
- Communication
- Calendar

4 USEABILITY
- Seamless
- Squeezing Strenght
- Simplicity

5 ACCURACY
Physical
- Stability
- Shaking
- Success rate

6

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MOOD BOARD

5

Concept 1

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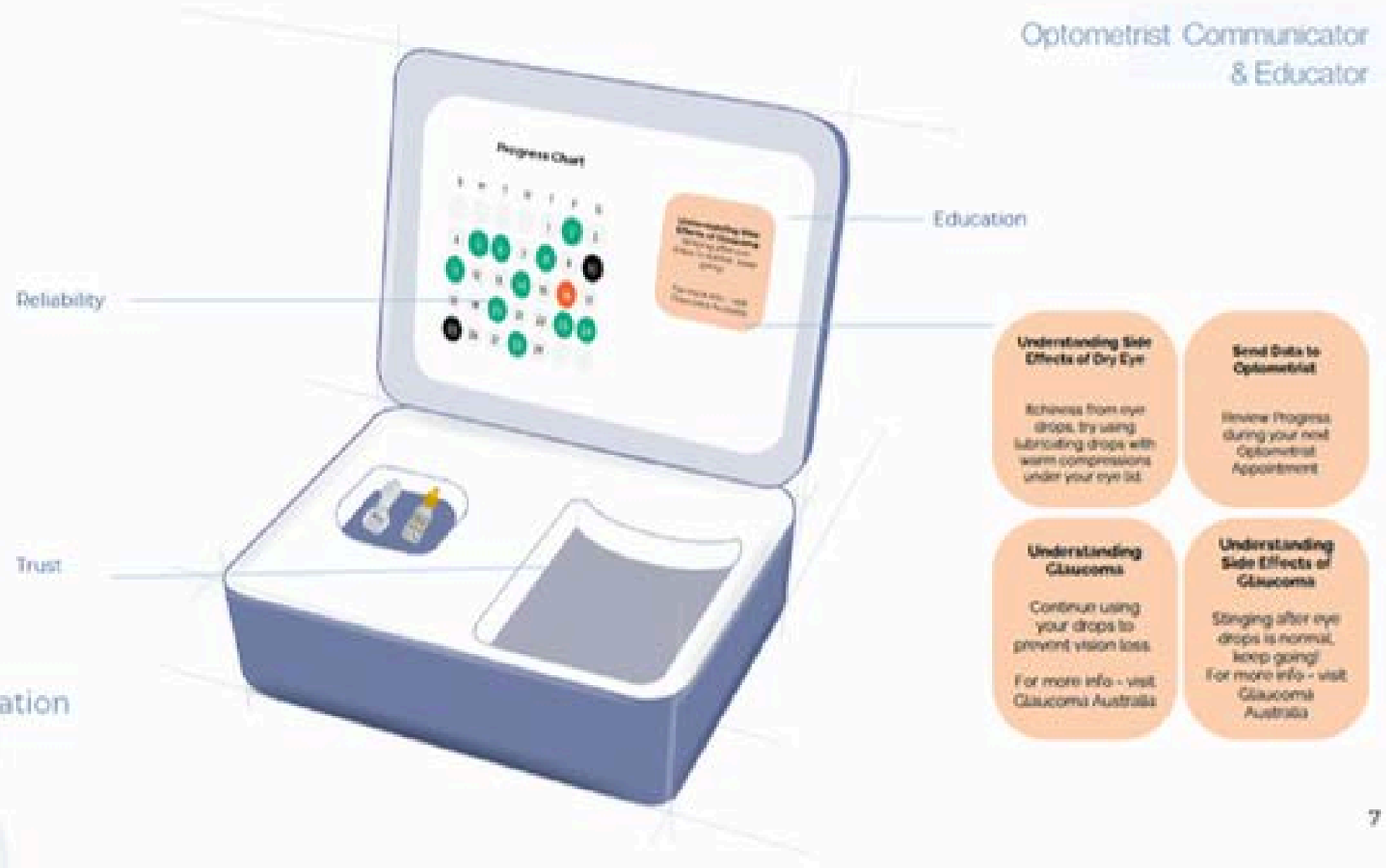
CONCEPT 1

Emotional Adherence
psychological, motivational, feelings

GAP
Designing for the patient's emotions, with conscious consideration. Optometrist's early intervention, education and support.

OPPORTUNITY
Patients to feel dignified and self-empowered when engaging in independent participation in treatment adherence.



Trust Dignifying Education

7

Concept 2

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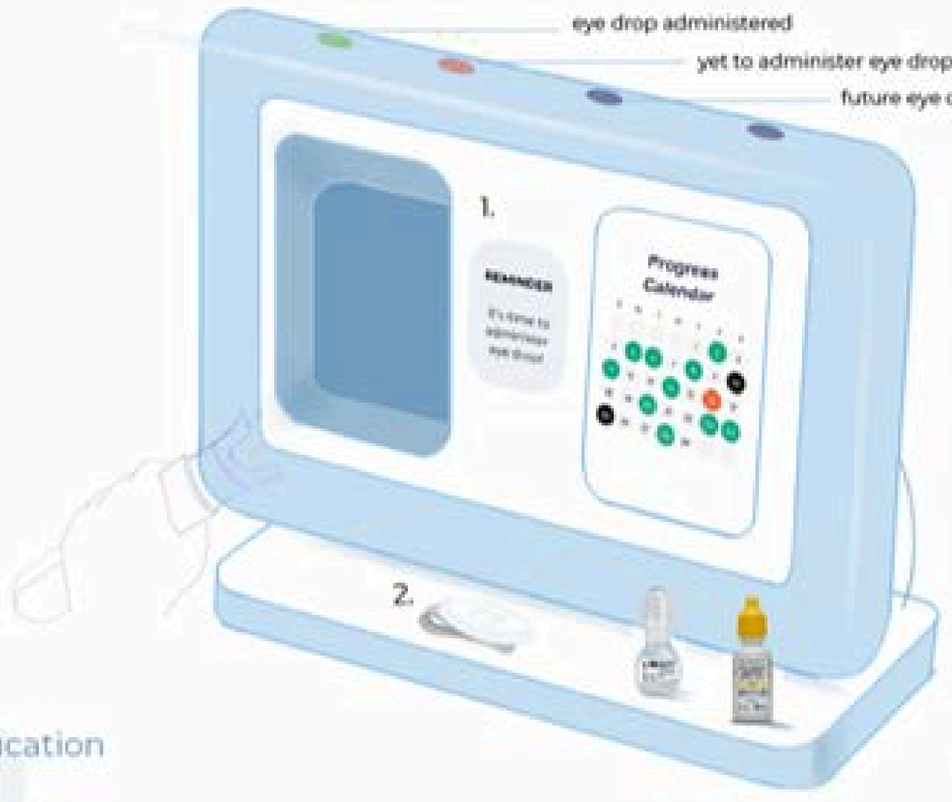
CONCEPT 2

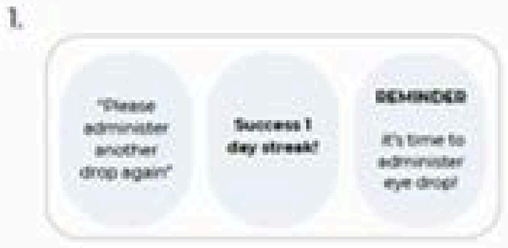
Mental Adherence
Neurodivergence , anxiety , depression, behavioural

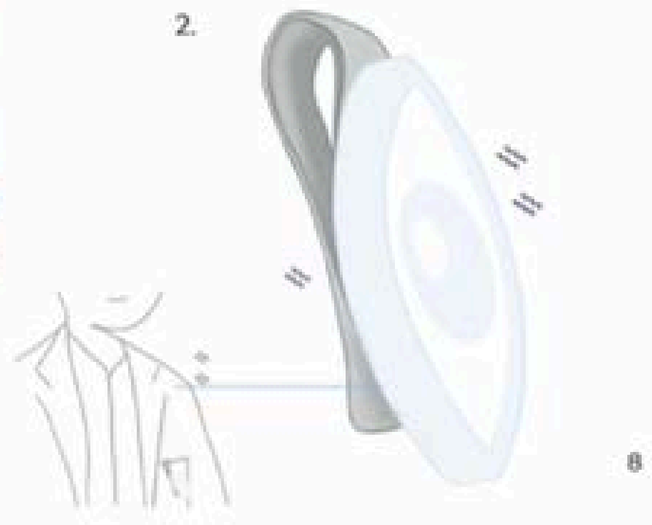
GAP
designing for neurodivergent individuals, dementia, regular memory issues, depression and anxiety.

OPPORTUNITY
Preventing patients from forgetting to administer eye drops (at the prescribed time) and at the correct dosage. Design implications include reminding patients and reinforcing emotional feelings of encouragement towards their progression



Calendar, Reminder & Encouragement





Trust Dignifying Education

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Concept 3

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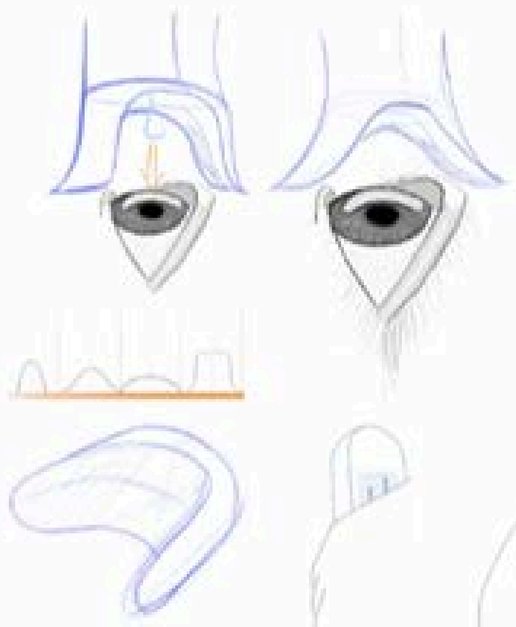
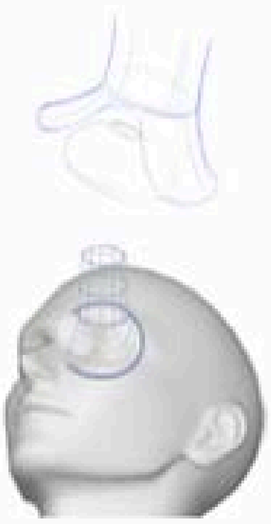
CONCEPT 3

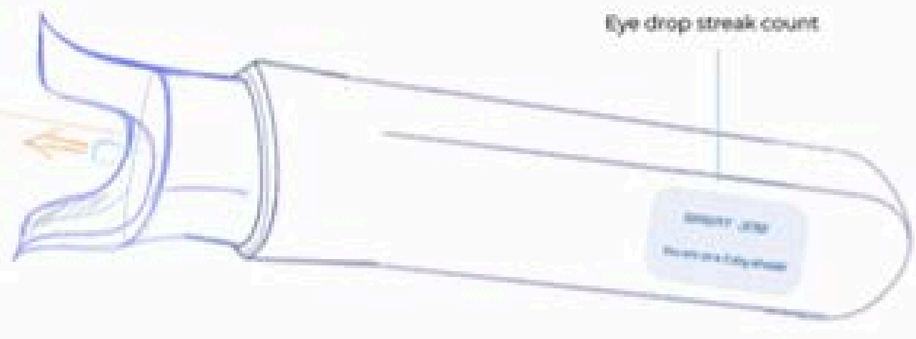
Mental and Physical Adherence
psychological, cognitive, motivational, feelings

GAP
minimising the fear and anxiety when administering eye drops.

OPPORTUNITY
Allowing the patient's hand to be stable when resting on the upper and lower areas near the eye. Large handle shape for parkinson's users, thus trusting the eye drop will aim for the eye.







Trust Useabiliity Accuracy

9

Concept 4

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CONCEPT 4

Physical Adherence

Parkinsons, Arthristic, Upper Mobility
Strenght & Dexerity

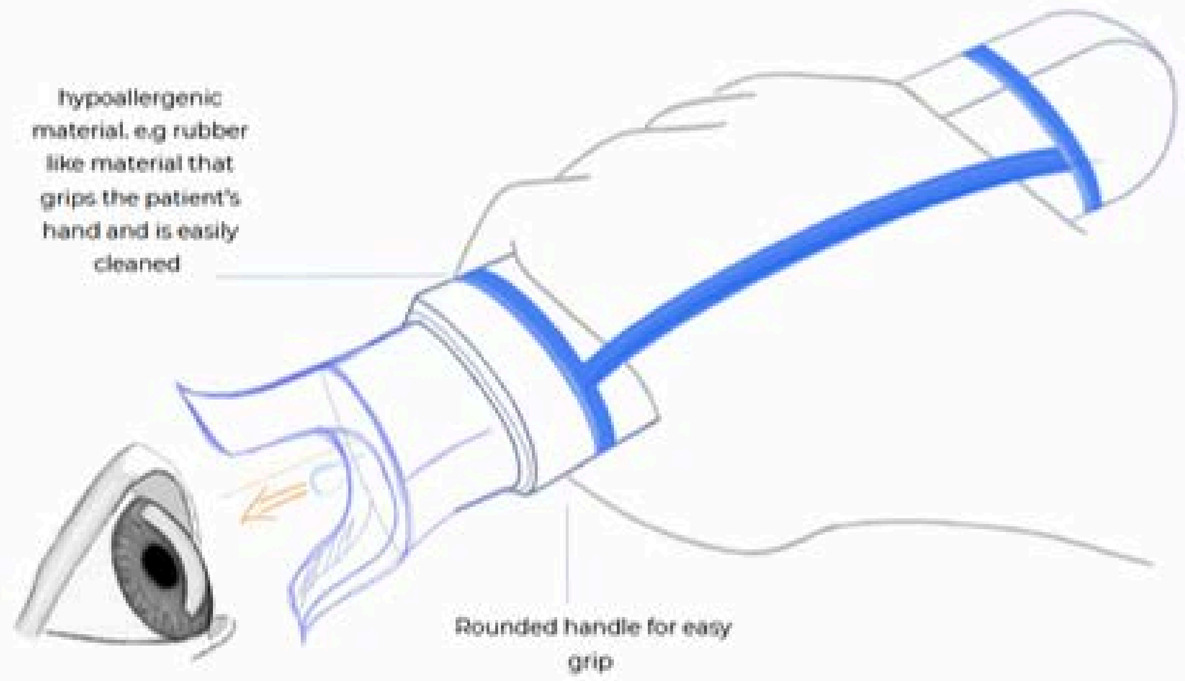
GAP

Eye drops are missing the eye and wasting eye drop product, such as Xalatan, Cationorm, and Vizo-PF Dorzolatim. Unable to administer their own treatment independently, thus needing to encourage the independent and accurate administration of eye drops.

OPPORTUNITY

Parkinson's disease and arthritis patients can stabilise with an eye drop aid product. Technology regarding eletronically moving the device when the patient is shaking can be introduced too

Low Arm Strenght &
Grip Handle



Useabiliity
Accuracy

45

10

Concept 5

ID7 | PROJECT OVERVIEW
Drop Assist

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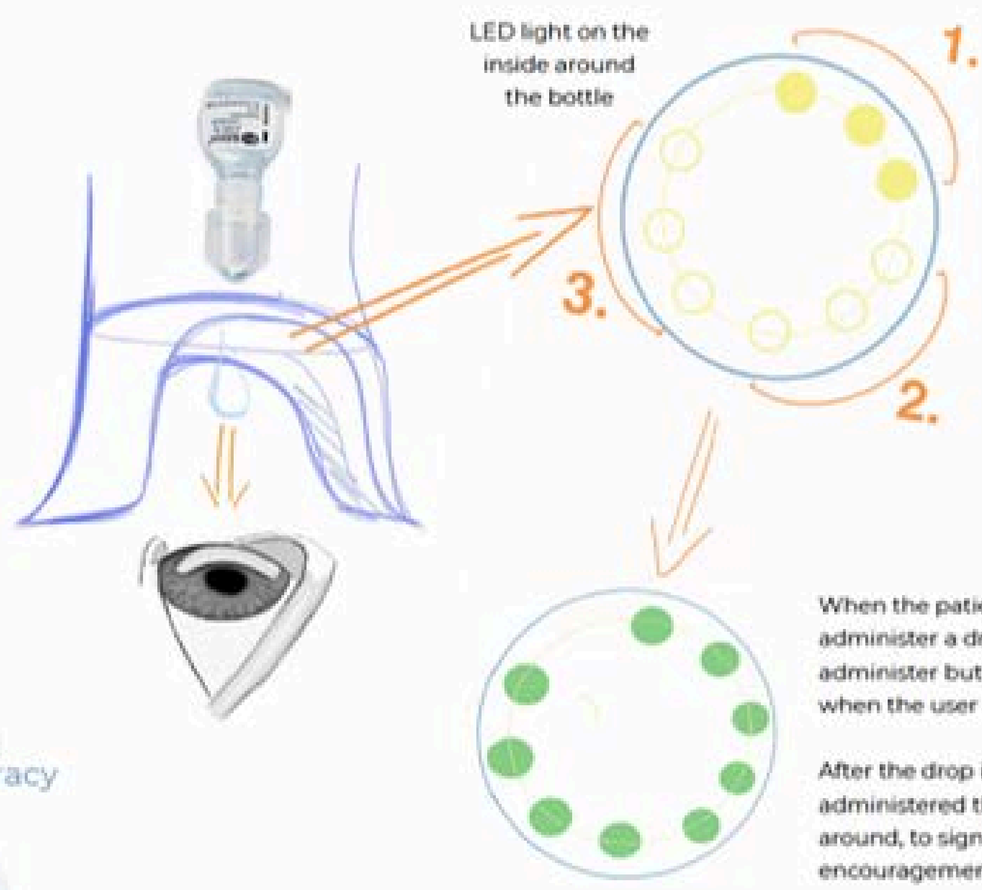
CONCEPT 5

Emotional & Physical Adherence
Parkinsons, Arthristic, Upper Mobility
Strenght & Dexerity

GAP
Green light around the back of the eye stabiliser so the patient can see when to click the device to administer drop - to ensure accurate administration and reduce eye drop waste.

OPPORTUNITY
The opportunities presented include allowing the patient to feel empowered, dignified and not ashamed, whilst allowing patients to take part in their treatment.



The light will be sectioned off into 3 parts. Once the device is tilted with a mercury ball the timer will start with one light sector going off, and when all lights are on

When the patient is ready to administer a drop they can tap the administer button, and it will drop when the user is ready

After the drop is successfully administered the light will flash around, to signify completion and encouragement

Accuracy
Administration

Dignifying
Useabiliity
Accuracy

11

Concept 6

ID7 | PROJECT OVERVIEW
Drop Assist

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CONCEPT 6

Interchangeable Eye Drop Bottles

Emotional and Mental Adherence
psychological, cognitive, motivational, feelings

GAP
Eye drop bottles need to be interchange in the device. Eye drop products include, Xalatan, Vizo-PF Dorzolatim, systane hydra, Cationorm, timolol, alphaGAN,

OPPORTUNITY
bottle are interchangeable and replace one another when a patients needs to administer different eye drop bottles/ solutions. the ideas is also to swap out expired eye drop bottles easily as they need to be changed every 6-8 weeks

OPPORTUNITY 1
1. Eye drop bottle shape is different and difficult to interchange.
- changing and adapting numerous sprial shaped mechanisms when opening eye drop

Xalatan

Vizo-PF Dorzolatim

Cationorm

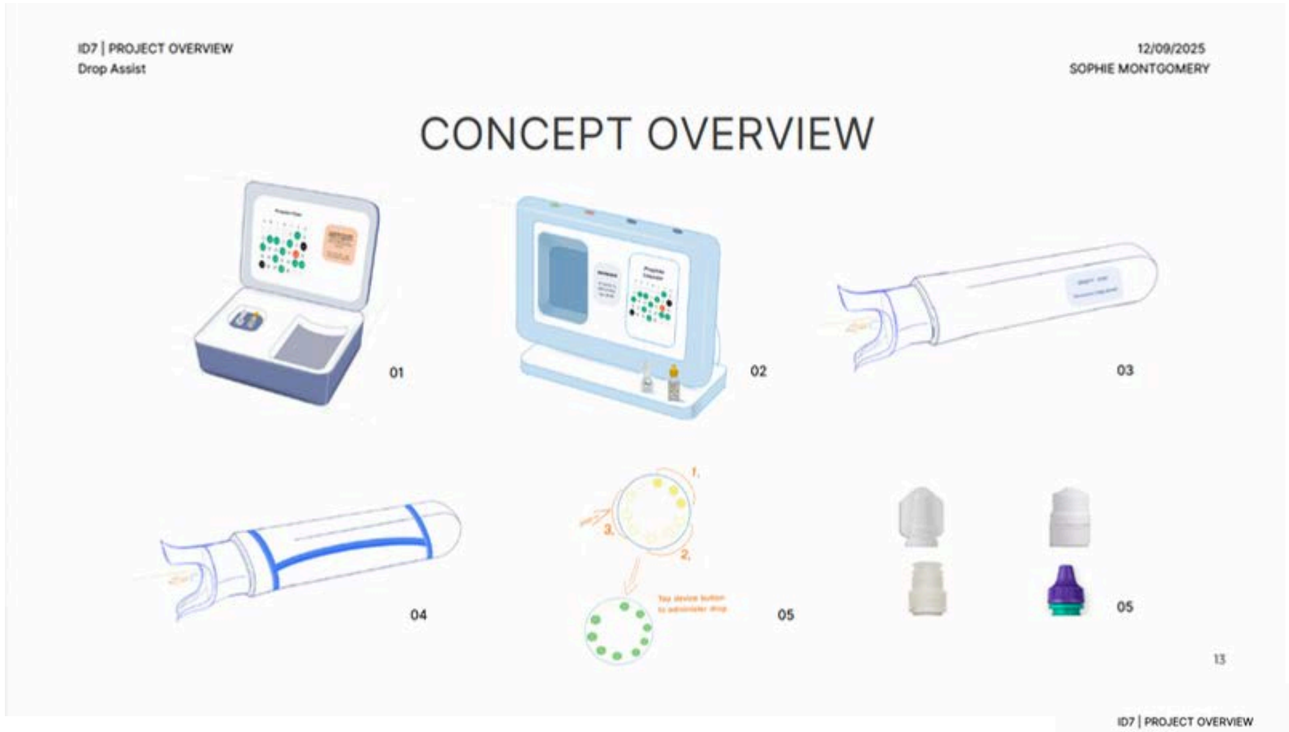
alphaGAN

Education 35 Accuracy

OPPORTUNITY 2
Reminder to always check the expiration date of drops - or state '40% of bottle remaning'

12

Concept - Concept Overview



Different Eye Drop Bottles

I**SSUE:** companies prioritise long term preservative free bottle designs over ease of use

bottle types

- Xalatan -->Xal-ease -->help with administration in those who have limited use of their hands.
- Xalacom->Xal-ease
- Vizo-PF Dorzolatim
- Systane PF
- Cationorm
- Vials
- **antibiotic drop -** Post cataract surgery
- **steroid drop -** Post cataract surgery
- **anti inflammatory -** Post cataract surgery
- user-filled spray device
- eye drop that stings (which most prostaglandin analogue treatment drops do)

emotional and mental adherence issue:

- There is a lot happening, so in the practice I worked at we would provide the patient with a calendar of sorts with tick boxes to tick off each drop for each day over the 6 week period and written instructions outlining this in detail. However even with all of these instructions, some patients really struggled to follow the regime, or would lose the calendar, or just stopped the drops after a week when the eye felt better! So again, communication is key.
- suggestion of reassurance could be useful, in terms of perhaps an electronic calendar that gave a reassuring statement with a ‘streak of XX days’ etc